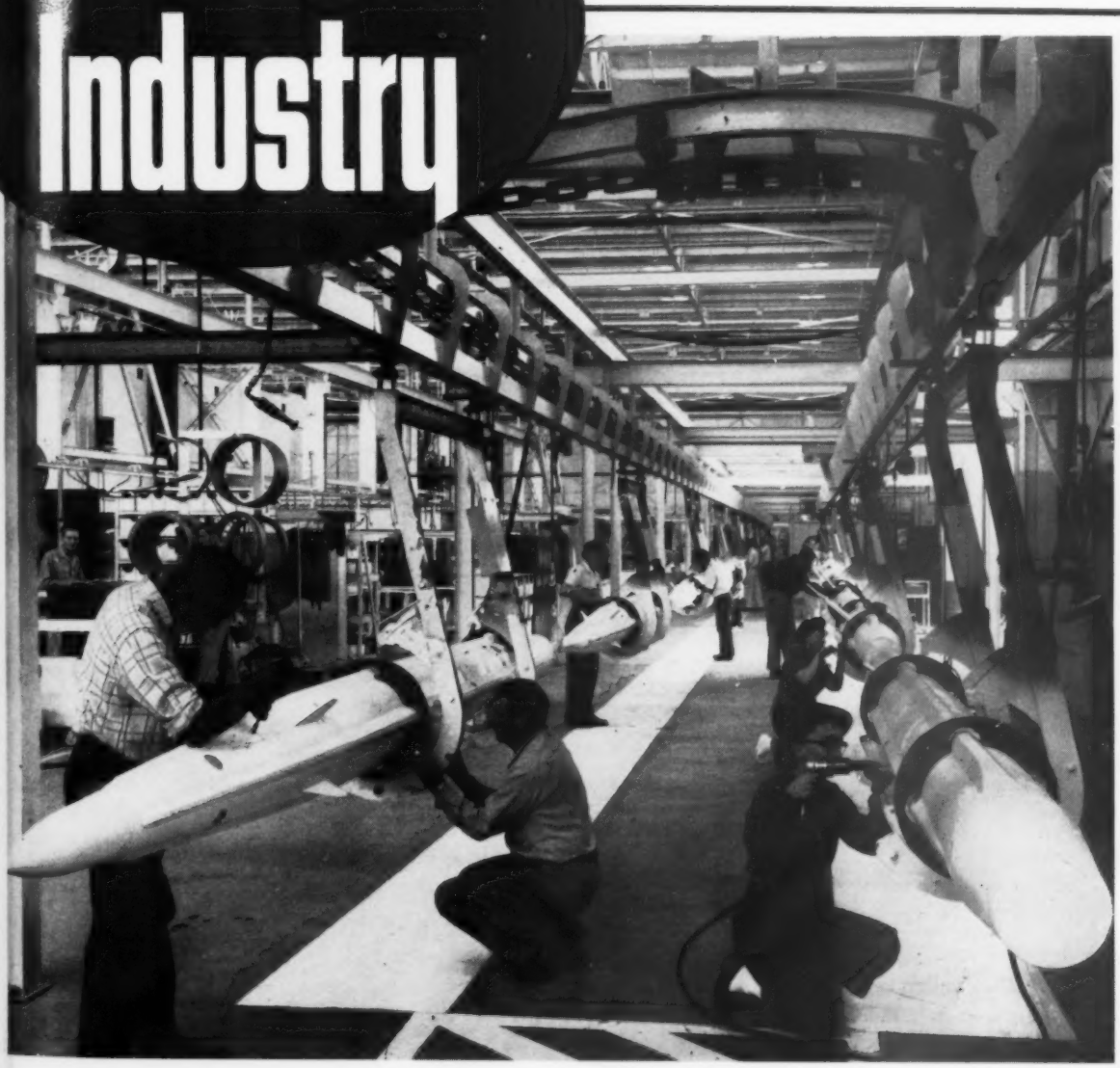
# Western Industry

May 1956



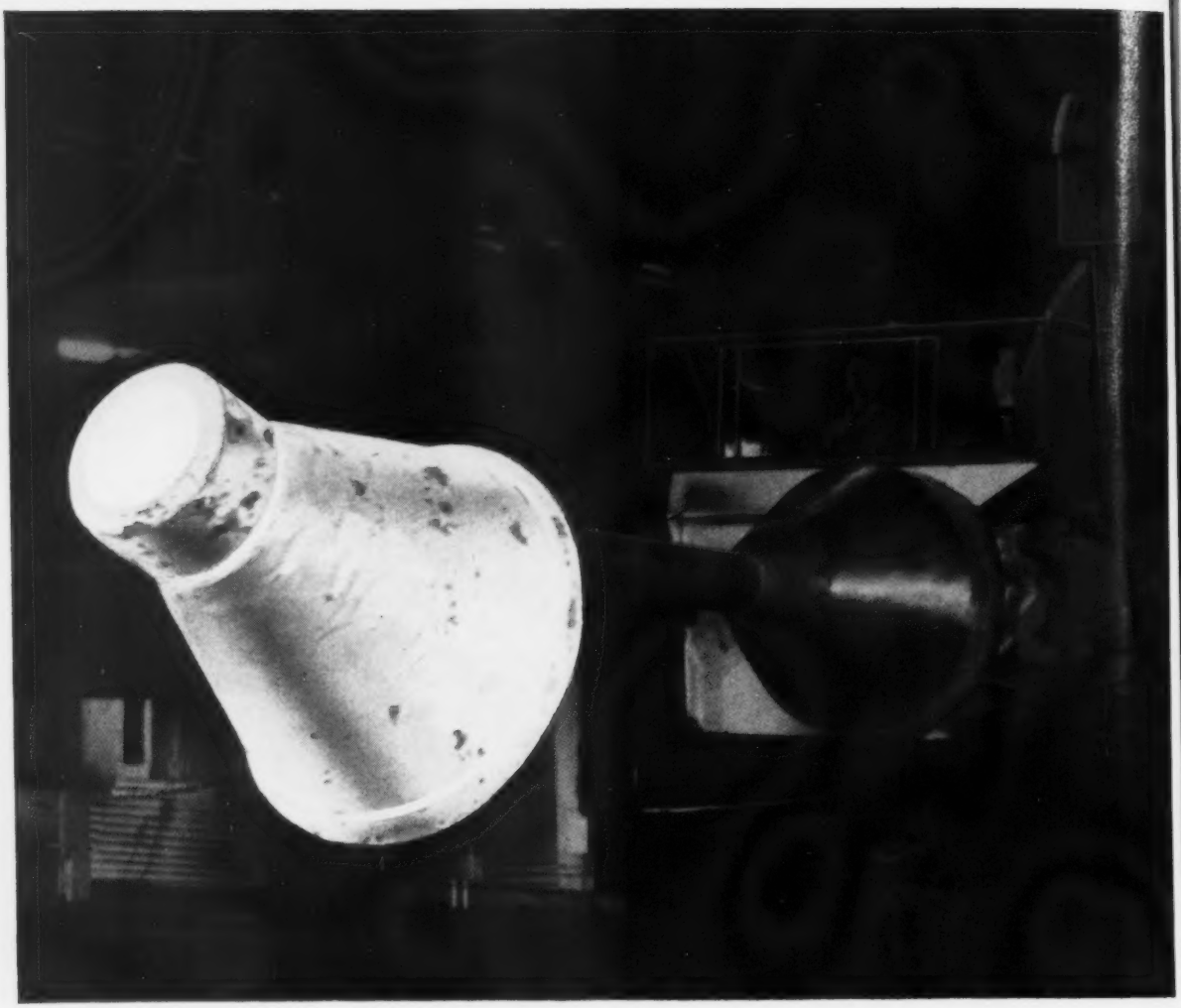
**NEW STRUCTURAL ADHESIVES** pioneered in the West are the strong but lightweight backbone of Nike guided missiles, shown in production here at Douglas Aircraft's Santa Monica plant. It's time you determined how you can use these fabulous fast-developing adhesives in your plant. For some ideas, see page 40

**SELL YOUR SCRAP** and clean up some $$$. Convair shows you how to sort and sell "waste," p. 43

**THE BATTLE FOR ENGINEERS**—How the West beats the bushes for job-loose brainpower, p. 44

**ROTATING COMPRESSOR TIPS**—How to select, set up, operate, maintain today's units, p. 52

**60 VALVE & FITTING MANUALS — yours for the asking . . . page 66**



# 7,000-lb. alloy steel cone forging no problem for National Supply

Designed for use in high pressure vessels, this huge alloy steel cone is one of several recently produced at National Supply's Torrance Plant. To overcome the handling problem created by its unusual shape and weight, National engineers readily developed a special mandrel to control the forging on the manipulator. The large hole in the small end of the cone—required for the mandrel—was closed by another forging operation and excess metal cut off by a torch. Then the cone was machined on a vertical boring mill. The result: a precision job, finished efficiently to the customer's specifications.

Big, specialized jobs which require smooth handling and precision work are typical of daily operations at National's Industrial Products Division. Complete facilities, engineering skill and experienced plant operators are the vital ingredients that make National a logical source for your specialized steel products jobs. Why not plan a visit to Torrance to see for yourself how they can help you?

THE
**NATIONAL SUPPLY**
COMPANY

INDUSTRIAL PRODUCTS DIVISION
Torrance, California • Los Angeles Area

Ideal Pressed Steel Forgings • Billets and Large Bars
Steel Castings and Special Machinery
Melting • Forging • Casting • Machining • Heat Treating
Assembling • Welding • Testing

*. . . for more details, circle No. 1 on Reader Service Postcar*

May

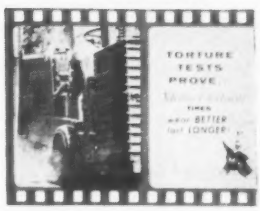
# BEFORE YOU'RE *TRAPPED* BY TIRE REPLACEMENT COSTS SWITCH TO MONARCH INDUSTRIAL SOLID TIRES

Everyone knows that "rising costs" are rough on profits. Every cost-conscious lift truck user also knows replacement tires can be a major item in his maintenance budget . . . that frequent tire replacement is a luxury he can't afford.

That is why more and more buyers are turning to MONARCH industrial solid tires to reduce materials handling costs. Produced from tough durable Compound T-48C, MONARCH tires are setting new records in performance and long-range economy. Dollars-and-cents facts prove that they give more ton-miles per dollar.

Monarch has a complete range of types and sizes to meet every lift truck requirement. Stocked by lift truck dealers and independent tire distributors across the country, Monarch solid tires are your best buy for all-around efficiency and savings.

For additional details, see the Yellow Pages for the name of your nearest dealer . . . or write today for BULLETIN TD-200.




6904-MR

THE
**MONARCH**
**RUBBER COMPANY**

- 280 Lincoln Park • Hartville, Ohio
- 7-225 General Motors Bldg., Detroit 2, Mich.
- 1035 Bartlett Street, Hayward, Calif.

*. . . for more details, circle No. 2 on Reader Service Postcard*

KING PUBLICATIONS

May 1956

Vol. XXI, No. 5

## ARTICLES

**How to develop effective small plant managers** . . . . . 35
Timely help on Western plants' toughest problem—developing the greater management abilities needed at all operating levels.

**New uses for structural adhesives** . . . . . 40
An up-to-date account of the rapidly expanding industrial applications of this strong but lightweight fastening material.

**Million $$$ from sale of scrap** . . . . . 43
Here's how Convair sorts and sells "waste" materials left over from its San Diego, Calif., manufacturing set-up.

**The West's battle for engineers** . . . . . 44
A special WI report on the scramble for the West's most wanted men, with case-history examples of recruitment methods.

**On-the-spot equipment storage** . . . . . 49
Tips on protection of equipment during storage, obtained from the "ready-to-roll" layaway of an entire ordnance plant.

**How-to data on rotary compressors** . . . . . 52
What they can do for you, which type will do it best for the West's various plant power tasks, and how to keep 'em running.

**60 manuals on valves and fittings** . . . . . 66
Reviews of latest manufacturer technical manuals you can obtain free.

## DEPARTMENTS

Views and Comment . . . . . 14
Labor Notes for the West . . . . . 18
Western Meeting Reports . . . . . 26
Helpful Literature . . . . . 74
New Equipment . . . . . 82
The Industrial West on Its Way . . . . . 93
Classified Advertising . . . . . 107
Advertisers in This Issue . . . . . 108

**EDITOR**
John J. Timmer

**ASSISTANT EDITOR**
L. V. Wilson

**NEWS EDITOR**
Beverly T. Watkins

**CONSULTING EDITORS**
A. C. Prendergast
Market and Industrial Development

Roy C. Henning
Electricity and Electronics

**SOUTHERN CALIFORNIA EDITORIAL CORRESPONDENT**
Sterling Gleason
Los Angeles, Calif.
Phone PLeasant 1-2580

**PRODUCTION MANAGER**
Patricia N. Mann

**CIRCULATION MANAGER**
Kyle Cunningham

Published monthly by
**KING PUBLICATIONS, INC.**
609 Mission Street
San Francisco 5, Calif.
Phone YUkon 2-4343

James I. Ballard . . . President
V. C. Dowdle . . Vice Pres., Adv. Sales
L. P. Vrettos . Secretary and Treasurer

**ADVERTISING SALES**

CLEVELAND—Robert J. Lick
313 E. 216th Street
Cleveland 23, Ohio
Phone REdwood 1-8562

CHICAGO—Gordon H. Gannett
1386 Asbury Avenue
Winnetka, Ill.
Phone ROgers Park 4-4500

MILWAUKEE—Richard W. Morey
725 N. 115th Street
Wauwatosa, Wis.
Phone SPring 4-9093

SAN FRANCISCO and PACIFIC NORTHWEST—John R. Vanneman
609 Mission Street
San Francisco 5, Calif.
Phone YUkon 2-4343

LOS ANGELES—Jerome E. Badgley
Vice President
128 So. Mansfield Avenue
Los Angeles 36, Calif.
Phone WEbster 8-8512

WESTERN MANAGER—Roderick V. Pierce
1773 N. Sycamore Ave.
Apt. 15
Hollywood 28, Calif.

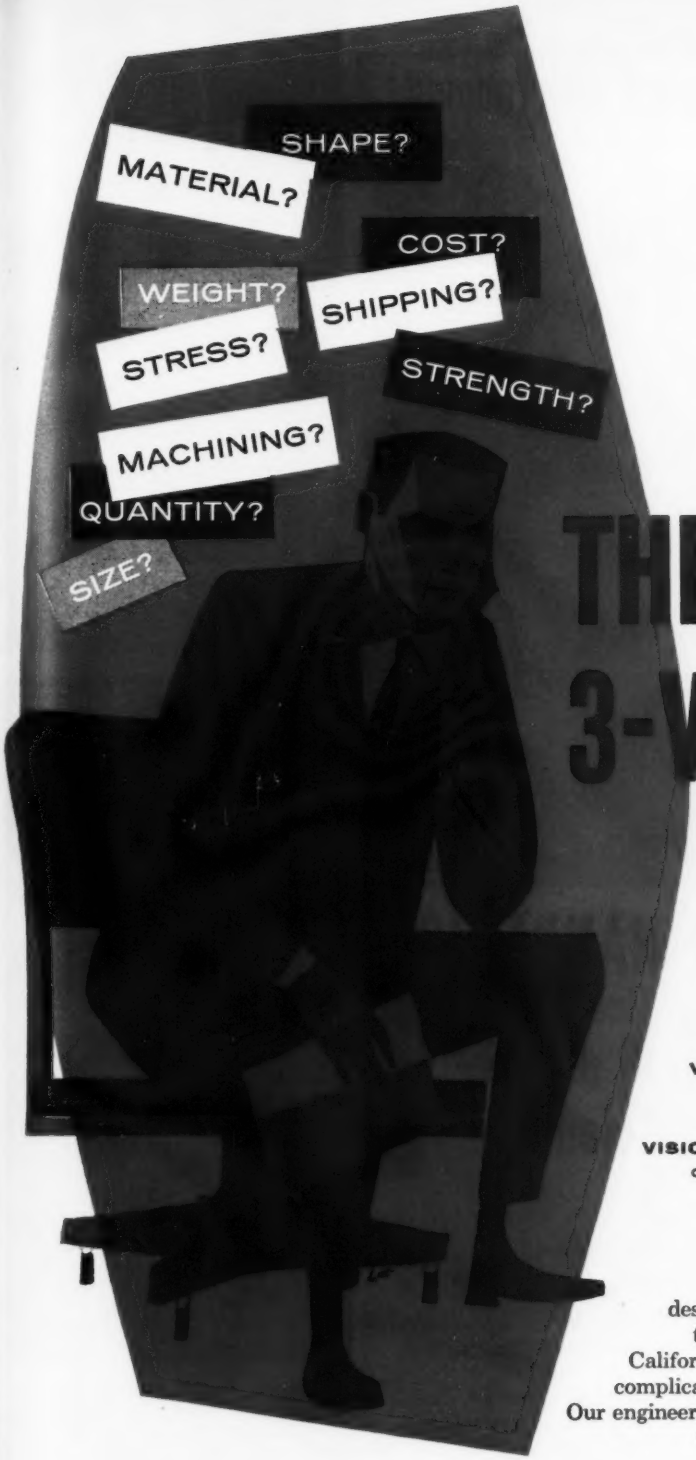
BPA NBP

50c per copy $4.00 per year

Accepted as Controlled Circulation Publication at Los Angeles, California

Copyright 1956, King Publications, Inc.

**SERVING ALL INDUSTRY IN THE NATION'S FASTEST GROWING REGION**




# LET THE AMFORGE 3-V PROGRAM HELP YOU!

**VARIETY:** The equipment to forge many different sizes and shapes.

**VERSATILITY:** The ability and skill developed through years of experience to help you engineer your forgings.

**VISION:** A desire and willingness to become your continual *partner* in the solution of your forging problems, present and future.

Your forging needs can become a mutual problem. The AmForge 3-V program was designed to relieve you of the burden confronting the man illustrated above. Our plant in Azusa, California, is equipped to follow through on the most complicated of orders—either Press or Upset Forgings. Our engineers are prepared to work with you. Please phone us collect when you have a "forging" problem.
Phone: EDgewood 4-4931

AMERICAN **Brake Shoe** COMPANY

**AmForge Division**

155 N. WACKER DRIVE, CHICAGO 6, ILLINOIS

**PLANTS: AZUSA, CALIFORNIA • CHICAGO, ILLINOIS**

*. . . for more details, circle No. 3 on Reader Service Postcard*

## For HEATING, VENTILATING and AIR CONDITIONING

# NEW...

# WESTINGHOUSE AIR HANDLING COMBINATION UNITS in 13 basic sizes give you Unlimited Selection...

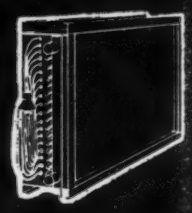
**The most complete line for every job—Westinghouse Air Handling Combination Units handle from 500 to 48,500 CFM.**

These versatile units, each with a choice of two coil face areas; in five coil types (see panel at right) and accessories as required, permit you to select from the broadest line in the industry.

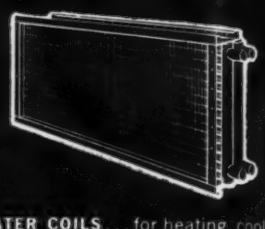
**Only Westinghouse Gives You:**

- High Efficiency
- Quiet Operation
- Non-Pulsating Air Flow
- Corrosion-Resistant Construction
- High Capacity—Low Resistance Coils
- Single Equipment Warranty

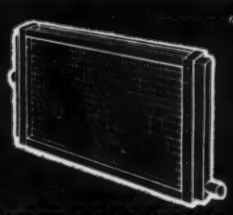
For complete application service, call your Consulting Engineer or your nearest Sturtevant Division Sales Engineer . . . or write Westinghouse Electric Corporation, Sturtevant Division, Department 21E, Hyde Park, Boston 36, Mass.



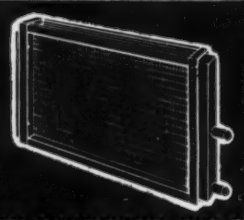
**DIRECT EXPANSION FOR COOLI AND DEHUMIDIFYING** . . . 3-4-5 a 6 rows deep.



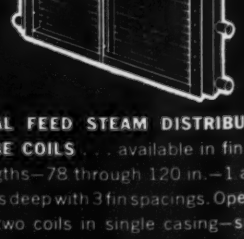
**WATER COILS** . . . for heating, cooli and dehumidifying—2 through 8 ro deep.



**STANDARD STEAM HEATING COIL** . . . for use with modulating dampe control—1 and 2 rows deep with 3 f spacings.



**STEAM DISTRIBUTING TUBE COILS** . . . for use with modulating steam valv control—1 and 2 rows deep with 3 f spacings.



**DUAL FEED STEAM DISTRIBUTIN TUBE COILS** . . . available in fin tu lengths—78 through 120 in.—1 and rows deep with 3 fin spacings. Operat as two coils in single casing—supp and condensate connections at ea end—eliminates stratification.

# WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S Westinghouse

J-80891

*. . . for more details, circle No. 4 on Reader Service Postcard*

## How Grain Car Unloader Eliminated Backlog of Unloaded Grain Cars

A backlog of unloaded grain cars often created the need for night work at Continental Grain Company, Longview, Washington. But with installation of a Link-Belt Grain Car Unloader, Manager D. L. Petersen reports he has eliminated this bottleneck . . . unloads as many as 81 cars in a nine-hour day, with one man controlling the entire operation. In addition, capacity can be increased should the need arise.

For the facts on Link-Belt grain car unloading methods, write for Folders 2294 and 2645. Or call your Link-Belt office.

*Quality through sanitation, efficiency through flexibility, guided construction and equipment design of the $20 million Anheuser-Busch brewery. A portion of the 25-ton per hour belt conveyor system beneath malt mill shows unusual discharge spouts and dust collection hoods.*

# Flexibility, Cleanliness Keynote Link-Belt Grain Handling System at New Coast Brewery

Link-Belt equipment meets every requirement for fast, efficient, sanitary handling of malt and rice at the new Anheuser-Busch brewery at Van Nuys, Calif. Included are belt and screw conveyors, bucket elevators and other equipment. Designed for handling malt and rice simultaneously, the system's chute and flop gate arrangement permits routing of grains to any of 12 bins.

Three of four belt conveyors under storage bins serve malt and rice bins. Fourth belt conveyor collects the malt from two of these belts for delivery to chutes leading to elevators. The third belt conveyor reclaims from the small bins and discharges directly to the chutes.

Belt conveyors were selected because they are self-cleaning and permitted the handling of malt and rice interchangeably. Grain from conveyors passes through chutes into either of two identical double leg bucket elevators for transfer to top of storage bins where it is discharged through chutes into two parallel screw conveyors. Each conveyor has four outlet chutes to feed either the malt or rice scale, scalper, screw conveyors leading to daily storage bins, or to a rotary valve which diverts grain back into any of the 12 primary grain storage bins. Parallel screw conveyors carry malt and rice to daily storage bins in the brew house. Grains are fed to single storage bins and drawn off into the grinding mills as needed. From here they drop into scale hoppers beneath the mills. Exactly proportioned grains are then fed to mashing tanks to begin brewing Budweiser beer.

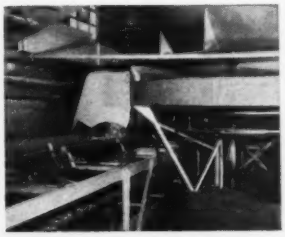
**LINK-BELT COMPANY**

Plants, Sales Offices and Factory Branch Stores at San Francisco 24, Los Angeles 33, Seattle 4. Sales Offices and Factory Branch Stores at Portland 10, Spokane 10, Oakland 7, Salt Lake City 1. Stock Carrying Distributors in Principal Areas. 14.047

## Wood Pulp and Board Mill Keeps Handling Costs Down

Link-Belt equipment is helping Fibreboard Products Inc., provide its new San Joaquin Division at East Antioch, Calif., with one of the most complete wood utilization programs in the nation. Link-Belt transfer chains move logs from live deck to bull chains. A chain feeder helps convey chips from the chipper dump to surge bin. A flight conveyor transfers chips from hopper to a belt conveyor feeding blending tank. These are fitted with Link-Belt 40-ton per hour rotary plate feeders. Link-Belt tripper distributes chips to digesters. A sloping screw conveyor moves chips through a water bath prior to processing.

*Two sets of Link-Belt transfer chains help convey logs from live deck to saw mill.*



*One of two Link-Belt rotary plate feeders discharges chips to L-B belt conveyors.*

*. . . for more details, circle No. 5 on Reader Service Postcard*

**The most talked about and potentially the world's greatest deterrent to war the Inter-Continental Ballistic Missile "TITAN" now being developed by one of America's most select teams of scientists and engineers.**

**DENVER,** the capital of Colorado, has been selected by The Glenn L. Martin Co. to be the site of the multimillion dollar plant where this new field of engineering will be explored.

It is a permanent research undertaking that offers you the important advantages of quickly achieving professional recognition and advancement while working in an organization where you will have close association with other leaders in the field.

Colorful Colorado offers the ideal climate in which to live; a vacationer's paradise all year round; a chance to really enjoy living and do creative thinking.

Martin invites Aeronautical and Mechanical Engineers and Technicians and Physicists to share these advantages with them and asks you to . . .

*Put yourself in one of these positions:*

| | |
|---|---|
| Rocket Propulsion | Aeronautical Engineering |
| Electronics Packaging | Flutter and Vibrations |
| Servo Design | Stress and Weigh Analysis |
| Stability and Control | Inertial Studies |
| Test Engineering | Reliability Studies |
| Ground Support | Performance |
| Equipment Design | Airframe—Missile Design |

**MARTIN**
DENVER DIVISION

*Address inquiries to: Emmett E. Hearn, Employment Director*
*Box 179, Dept. F-3, Denver, Colorado*

*. . . for more details, circle No. 6 on Reader Service Postcard*

# It's the NEW YARDLIFT® "150"

*with planetary drive*

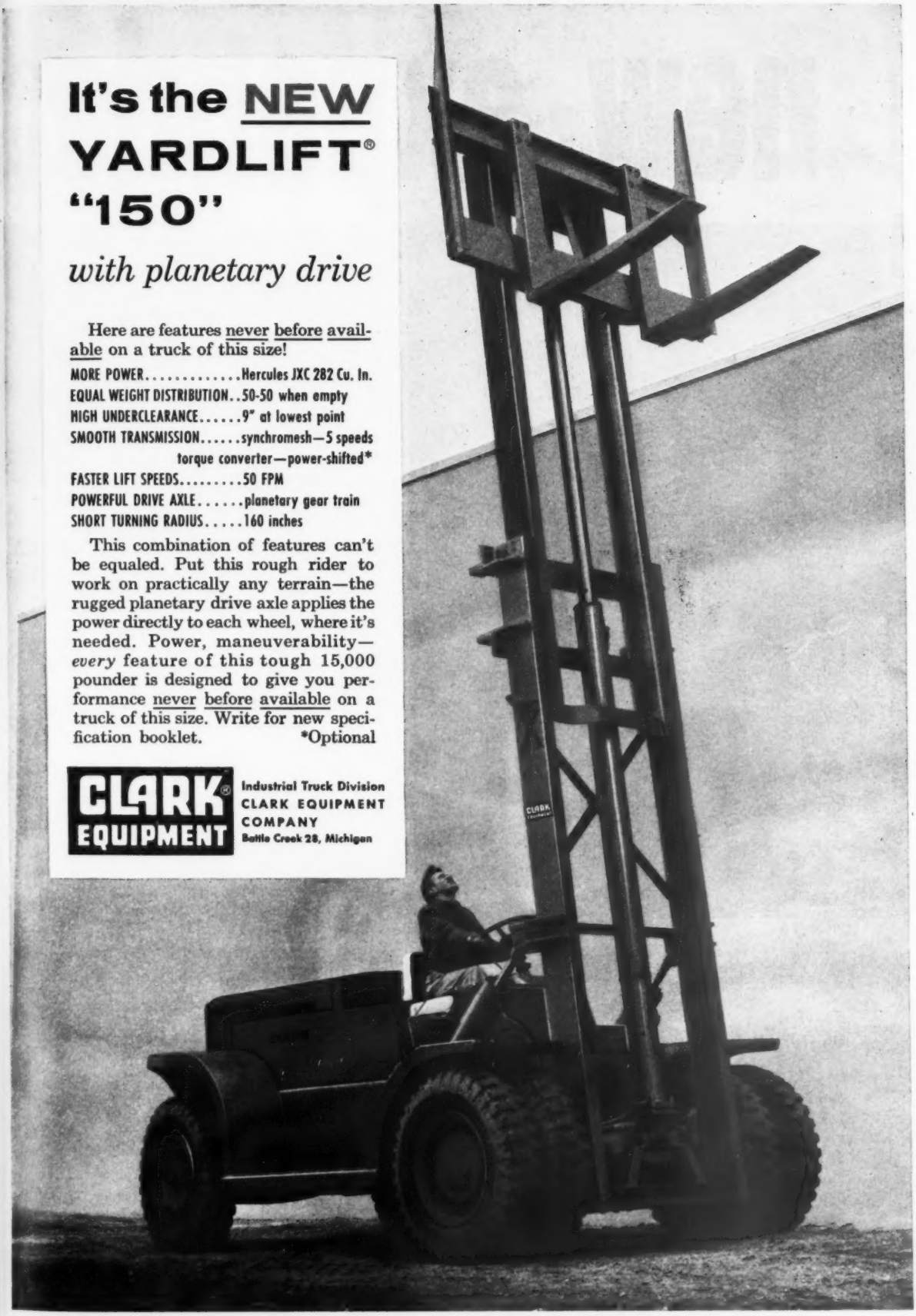
Here are features never before available on a truck of this size!

MORE POWER.....Hercules JXC 282 Cu. In.
EQUAL WEIGHT DISTRIBUTION..50-50 when empty
HIGH UNDERCLEARANCE.....9" at lowest point
SMOOTH TRANSMISSION.....synchromesh—5 speeds
torque converter—power-shifted*
FASTER LIFT SPEEDS.....50 FPM
POWERFUL DRIVE AXLE.....planetary gear train
SHORT TURNING RADIUS.....160 inches

This combination of features can't be equaled. Put this rough rider to work on practically any terrain—the rugged planetary drive axle applies the power directly to each wheel, where it's needed. Power, maneuverability—*every* feature of this tough 15,000 pounder is designed to give you performance never before available on a truck of this size. Write for new specification booklet. *Optional

CLARK® EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 28, Michigan




*. . . for more details, circle No. 7 on Reader Service Postcard*

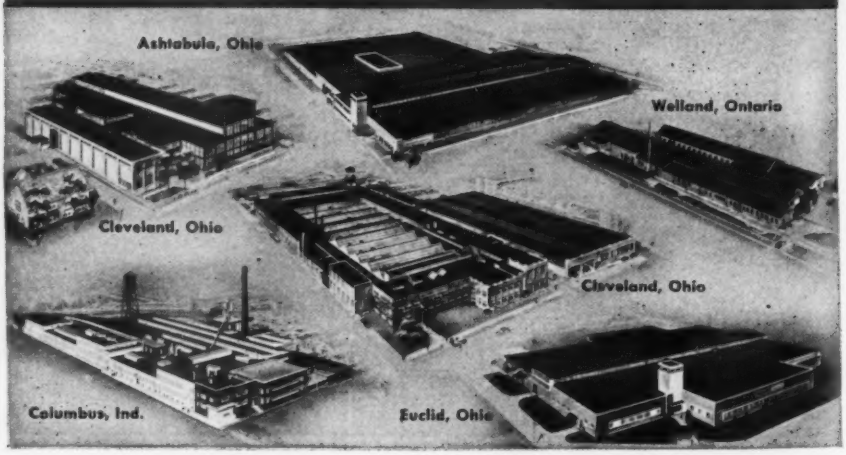
# new expanded

1525 Adrian Road, Burlingame, California

***Serving Western Industry in these cities:***

**San Francisco**
**Los Angeles**
**Portland**
**Seattle**
**Spokane**
**Salt Lake City**
**Phoenix**

## Other Reliance Electric and Engineering Co. Plants

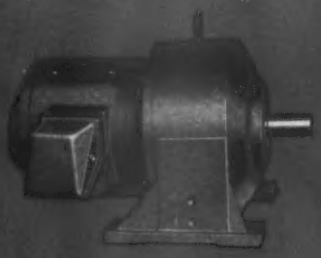


# service for your motor and variable speed needs

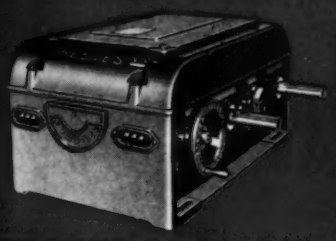
**TOTALLY-PROTECTED A-C. MOTOR.** A complete line of A-C. motors for all industrial applications, 1 through 300 hp.

**REEVES MOTODRIVE.** Wide range of assemblies and controls, ¼ through 40 hp. Speed ratios 2:1 through 10:1.

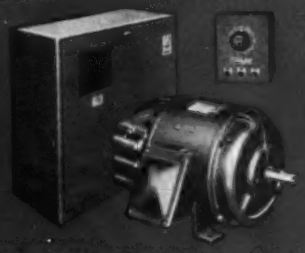
**TOTALLY-PROTECTED GEAR-MOTOR.** A-C. or D-C. from 1 through 60 hp., all AGMA output speeds.



## *now built on the West Coast . . . ready for delivery!*



**REEVES TRANSMISSION.** Vertical or horizontal models, open or enclosed types, fractional to 87 hp., 2:1 through 16:1 speed ratios.



**V★S DRIVE.** All-electric variable-speed drive for one machine or a complete production line, 1 through 300 hp.

**REEVES MOTOR PULLEY.** Low cost variable speed, fourteen models, ⅛ through 15 hp., 1.75:1 to 4:1 speed ratios.

The week of May 21st will mark the opening of a new Reliance plant in the San Francisco Bay area . . . Burlingame, California.

This plant will assemble, modify and distribute motor and drive products for West Coast industry . . . providing better, faster service.

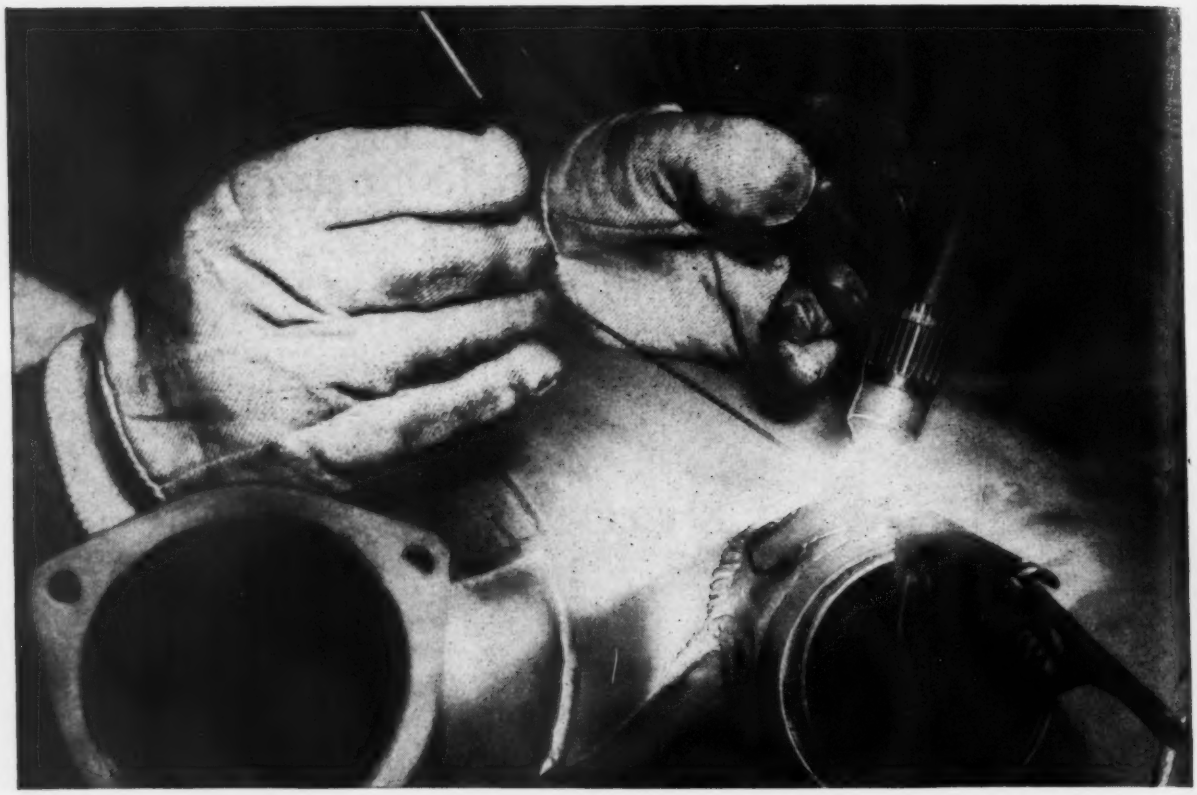
The present Reliance stocking facilities and the Reeves assembly plant have moved to this new, modern plant. Standard units—as well as special flanges, mounting positions, output speeds, and enclosures—are now available for prompt shipment.

Whatever your drive requirements, look to Reliance—the world's largest company devoted exclusively to the manufacture of motors and variable-speed drives for industry.

For our new booklet "Widening the Horizons of Automation," write 1525 Adrian Road, Burlingame, California.

**RELIANCE ELECTRIC AND ENGINEERING CO.**

*. . . for more details, circle No. 8 on Reader Service Postcard*



It took only 10 min. to repair this aircraft manifold by HELIARC welding—the savings amounted to $1,485 over the price of a new manifold.

# "HELIARC" WELDING SAVES 99%

## *Of New Part Cost . . .*

Throughout industry, HELIARC welding is being used to make repair welds in all types of commercially fabricated metals—at a fraction of new part cost. In the repair operation shown here, a 1/16-in. thick stainless steel aircraft engine exhaust manifold was HELIARC welded and made good as new for $15 . . . the cost for a new manifold would have been $1,500.

Whether used for fabricating or repairing, HELIARC welding is ideal for joining light gage metals. Welding can be done in all positions on all types of joints—with portable manual, and semi-automatic equipment. Mechanized setups are also available.

In HELIARC welding there is no slag, spatter, or smoke. The weld area is argon-gas-shielded from the harmful effects of the atmosphere, and the operator can see and control the weld puddle at all times.

HELIARC welding may be the answer to *your* fabricating and repair problems. Find out—call or write your local LINDE Representative today.

**Linde Air Products Company**
**A Division of Union Carbide and Carbon Corporation**

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities
In Canada: LINDE AIR PRODUCTS COMPANY
Division of Union Carbide Canada Limited, Toronto

*The terms "Linde" and "Heliarc" are registered trademarks of Union Carbide and Carbon Corporation.*

Linde
Trade-Mark

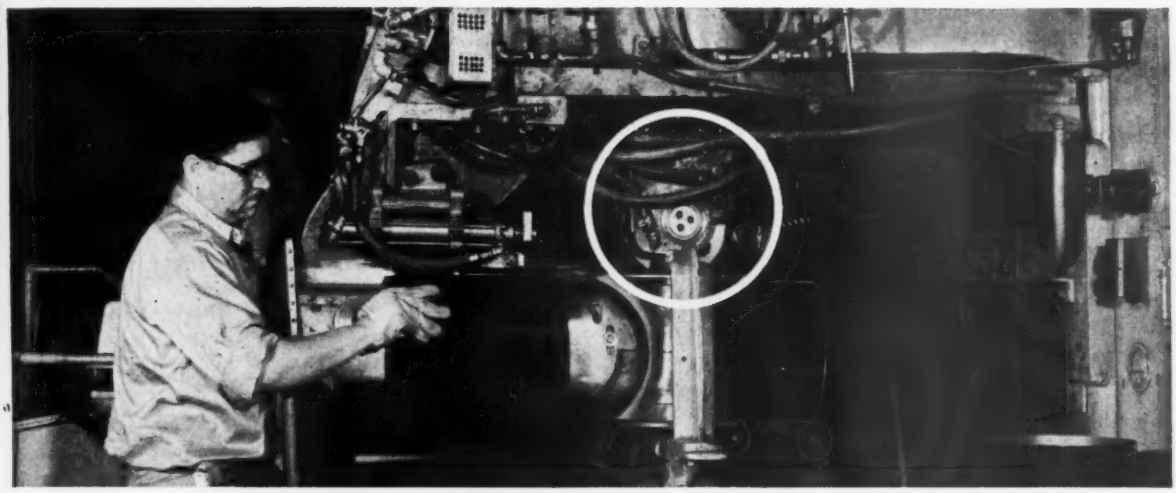
*. . . for more details, circle No. 9 on Reader Service Postcard*

# Standard Engineer's Field Report

*Another new product development*

CALOL INDUSTRIAL GREASE

# New grease replaces 3 specialized greases, stops leakage from welding-head bushings!



CALOL INDUSTRIAL GREASE, an entirely new grease made with a completely different synthetic thickener, has proved its outstanding lubricating qualities in all types of bearings under toughest conditions in a wide variety of operations.

Rheem Manufacturing Co.'s fabricating plant, Richmond, California, for example, eliminated leakage from welding-head bushings (see photo) even at temperatures from 400 to 500°F. and replaced three specialized greases previously used. Now in use throughout the plant, Calol Industrial Grease functions perfectly in dry-oven fans and motors, large journal bearings, high- and low-speed anti-friction bearings; gives better lubrication under all operating conditions.

CALOL

TRADEMARK "CALOL" REG. U. S. PAT. OFF

FREE FOLDER gives you complete information on New Calol Industrial Grease. Write or ask for it today.

FOR EXPERT HELP on lubrication or fuel problems, write or call your Standard Fuel and Lubricant Engineer or Representative, or write Standard Oil Company of California, 225 Bush St., San Francisco.

NEW CALOL INDUSTRIAL GREASE is strong in all lubricating qualities, eliminates need for most specialized greases in your plant.

NEW CALOL INDUSTRIAL GREASE speeds greasing time, prevents errors, cuts down space and stock control trouble, won't change in storage.

**Gives these outstanding advantages:**

- Mixes with any grease...forms safe mixtures, eliminates bearing removal and cleaning when you change brands.
- Exceptionally high melting point of 500° F.+ . . . thorough lubrication in extreme high-temperature operations.
- Extreme work stability...only slight softening after 1000-hour test that turns most greases to fluid in 4 to 20 hours.
- Excellent wear-prevention qualities . . . proved in service with steel-on-steel, steel-on-bronze, steel-on-babbitt bearings.
- Outstanding rust protection...in service or lay-up even in hot, moist conditions.
- Unusual water resistance...does not emulsify after more than a week in boiling water; conventional greases disintegrate after 4 min.
- Non-corrosive...will not corrode copper or any ferrous or non-ferrous metals.
- Pumpable over wide temp. range . . . Medium grade pumps through air dispensers at 3°F.

STANDARD OIL COMPANY OF CALIFORNIA

*. . . for more details, circle No. 10 on Reader Service Postcard*

Western Industry May 1956

# VIEWS & COMMENT

**THE WEST HAS PIONEERED THE WAY** in development of many types of industrial equipment, materials, and plant operating techniques during the past decade. There are good reasons, most of them stemming from the "newness" so characteristic of the industrial West—both in the thousands of individual plants that have sprung up to serve insatiable demands of the Western market, and in entire new industries that have been born and have prospered in the West's expanding industrial economy.

This newness has meant that industrial men here are accepting as standard procedure those very things that represent change in more established industrial areas. It has also meant that in the great majority of Western plants, where plant operating executives to a great extent are first generation management, there is no deep rooted operating philosophy that resists change to new and different procedure—in fact, ingenuity and innovation are accepted as natural.

It is entirely natural too that WESTERN INDUSTRY's editorial columns reflect this pioneering characteristic month after month. For instance, examples from the past three issues alone are: "$1,000 Analog Computers," in the February issue, with the West spotlighted as the analog computer development capital of the world; the first use of a gas jet turbine for in-plant industrial power—in the West, as reported in the March issue; and in the April issue, the first-published account of the "follow the white line" driverless industrial truck, brainchild of a Los Angeles engineer.

This month, our series of "pioneer" articles continues, with the description on pp. 40-42 of the countless uses that are being found for structural adhesives in all sorts of industrial applications. Pressured in this case by the needs of the West's aircraft and missile industries for lighter and stronger structural materials, the West has pushed the development of this promising product past frontier after frontier. We suggest that you assay the possibilities of structural adhesives in your plant—and that you keep an eye on WESTERN INDUSTRY's pages every month to keep up with innovations brainstormed in the nation's breeding ground of ideas.

•

**THE SPAWNING OF ELECTRONICS FIRMS** in Southern California has been at "quintuplet-rate," but the litters still aren't large enough! At this moment, 65% of the area's electronic component requirements are fulfilled by manufacturers outside of Southern California, says General Harold George, senior vice president of Ramo-Wooldridge Corp. In Northern California, self-supply development is at the same backward stage. No doubt about it, tremendous opportunities exist yet today for the manufacture of engineered and precision electronics components in California and the other Western states.

The Los Angeles Chamber of Commerce last month kicked off a timely "Critical Component Survey," in which 514 major electronics firms in the Los Angeles area will participate. The survey will determine just which components are needed to strengthen the electronics industry's component base, and in what quantities, important answers indeed for the next round of industrial expansion in Los Angeles and the West.

•

**IT'S NOT JUST THE AIRCRAFT COMPANIES** who are fighting for engineering talent in Southern California (see "The West's Battle for Engineers," pp. 44-46.) Electronics and instrument firms are having their brainpower problems too. And they're coming up with some clever ways to attract men their way. Two new programs hit the airwaves in Los Angeles last month, one on TV, one on radio, designed to capture eye and ear of possibly job-loose engineers (Consolidated Electrodynamics Corp. and ElectroData Corp. jointly sponsoring a half-hour weekly TV show that will spotlight high-interest engineering accomplishments, and Beckman Instruments, Inc., with a three-time-per-week "News for Engineers" radio program, to our knowledge the first newscast in the nation ever beamed exclusively to engineers).

It's simple arithmetic that Southern California firms could use three times the number of good engineers they now have available. With engineers in the area now being wooed by recruiters and via newspaper ads, billboards, trade shows, car cards —and now radio and TV—any unemployed engineer in the area who remains unaware of beckoning job opportunities must be deaf, dumb, blind . . . and in solitary incarceration.

**See the new Saw from C-B Tool Company**

IT WEIGHS LESS,
COSTS LESS,
WORKS BETTER

***The C-B Tool Co. Story***

It was easy! Engineers from C-B Tool Company, Lancaster, Pa. and OSTUCO in Shelby worked out a welded steel tubing component to replace a heavy, bulky oil reservoir and to serve as a handle for the new saw. See the difference this makes in the new Lancaster Model 400A chain saw:

- **Saves Cost—$4.25 on each chain saw!**
- **Saves Weight—3 pounds on each unit!**
- **Works better—Saw now has positive, continuous oiling instead of push-button oiling by the operator.**

*Perhaps this story from C-B Tool has a message for you.*

If you have trouble with see-sawing production costs and quality, OSTUCO may have the answer to your problems. Unique single-source service eliminates interplant shipment, reduces error, gives better production control. See about it . . . see OSTUCO! Contact the Shelby office or your nearby OSTUCO Sales Engineer for details.

OSTUCO SHELBY, OHIO **OSTUCO TUBING**

SEAMLESS AND ELECTRIC WELDED STEEL TUBING
—Fabricating and Forging

***OHIO SEAMLESS TUBE DIVISION***
*of Copperweld Steel Company* • ***SHELBY, OHIO***
*Birthplace of the Seamless Steel Tube Industry in America*

**SALES OFFICES:** BIRMINGHAM • CHARLOTTE • CHICAGO (Oak Park) CLEVELAND • DAYTON • DENVER • DETROIT (Ferndale) HOUSTON • LOS ANGELES (Beverly Hills) • MOLINE NEW YORK • NORTH KANSAS CITY • PHILADELPHIA PITTSBURGH • RICHMOND • ROCHESTER • ST. LOUIS ST. PAUL • SALT LAKE CITY • SEATTLE • TULSA • WICHITA

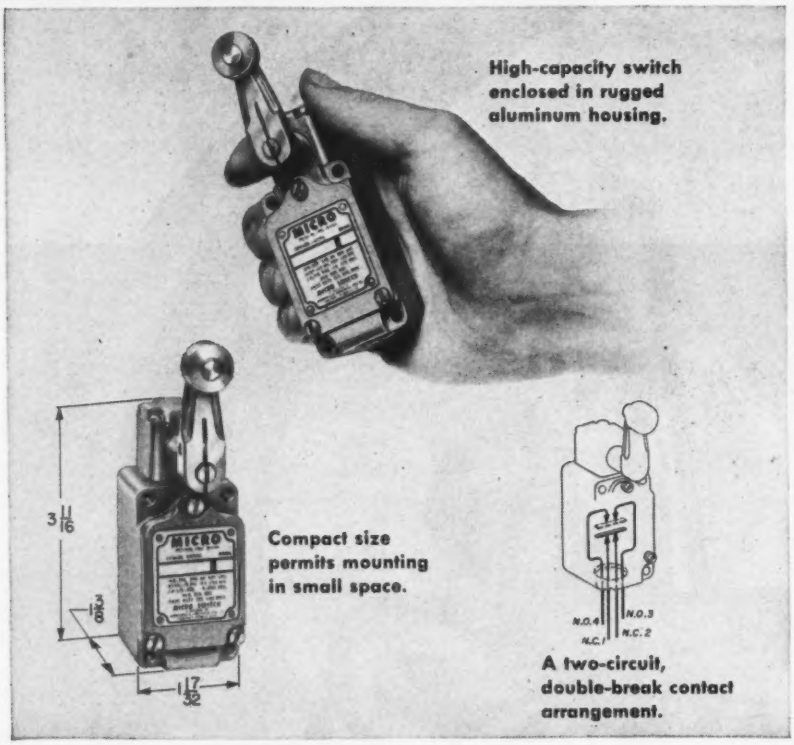
**CANADA,** RAILWAY & POWER ENGR. CORP., LTD.

**EXPORT:** COPPERWELD STEEL INTERNATIONAL COMPANY 117 Liberty Street, New York 6, New York

*. . . for more details, circle No. 11 on Reader Service Postcard*

# MICRO *precision switches*

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN




## Here is a compact 2-circuit limit switch that meets a wide variety of plant applications

This MICRO precision switch is designed to meet every requirement for a compact 2-circuit switch for use as a limit, safety or interlock switch on complex production equipment.

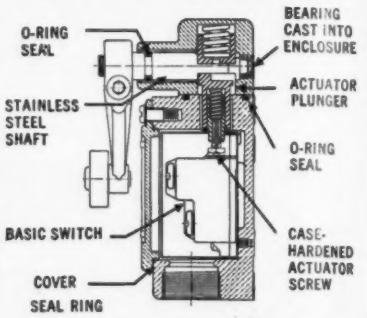
It has small size, extreme versatility, precision, reliability and ruggedness. All moving parts and the switching chamber are completely sealed, protected from wear or becoming fouled. Field adjustability permits its use in any type of application or location.

Two-circuit contact arrangement allows flexibility in circuit design. Reliability of the precision, snap-action unit assures accurate repeat operation throughout many millions of hard, fast actuations. Although small and compact in size, this switch is not only a precision instrument. It is designed and built to stand the most severe abuse.

The electrical rating is: 10 amperes 120, 240 or 480 volts a-c; ½ H.P. 115 volts a-c; 1 H.P. 230 volts a-c; .2 ampere 115 volts d-c; .1 ampere 230 volts d-c; .04 ampere 550 volts d-c. Pilot duty rating is: 600 volts a-c, max.

Like many other precision switches in the MICRO SWITCH line, this versatile 2-circuit switch is an ideal component for installation on present plant equipment. MICRO precision switches make production machinery safer, more automatic and more productive.

### Seals Provide Maximum Protection




Sealing is provided by use of O-ring seals on the actuator shaft and between the actuator head and the housing. A synthetic rubber ring seal is provided for the cover. These seals provide maximum protection against entrance of dust, oil and other liquids. The switch meets NEMA specifications for an oil-tight pilot device.

### Adjustable Head Assembly

The switch is easily mounted in almost any location. The user can remove the head and locate it in any of 4 positions (as illustrated).

### Field Adjustable Actuator

The roller arm actuator is field adjustable through 360 degrees, positively locking in any position. Actuators are assembled to operate in either direction. They can also be converted to operate in one direction only, clockwise or counterclockwise

Send for new catalog 83 on industrial enclosed switches.

*MICRO precision switches are sold by distributors in key cities everywhere. Look under "Switches, Electric" in the yellow pages of your phone book.*

**MICRO SWITCH**

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

*. . . for more details, circle No. 12 on Reader Service Postcard*

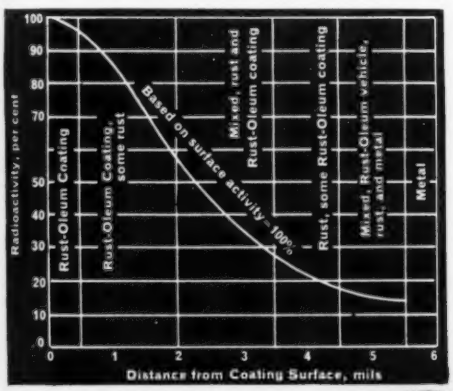
# RUST-OLEUM®

# PENETRATES

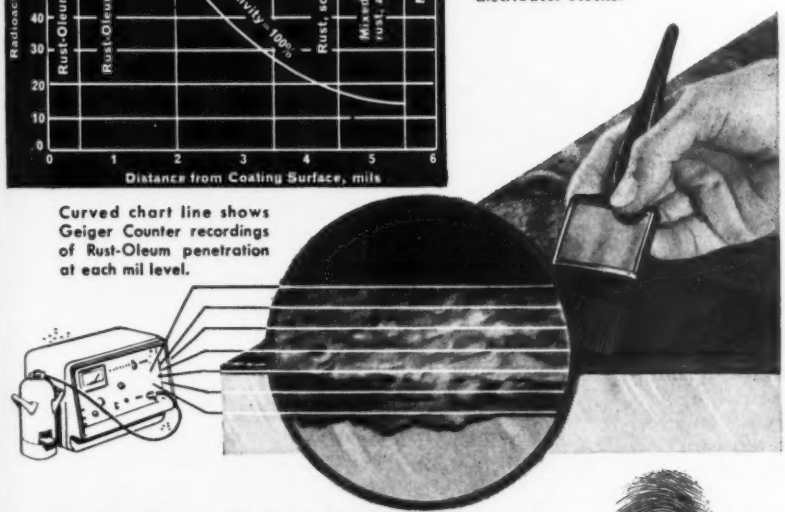
## rust... *to bare metal!*

To stop rust, the vehicle of a protective coating, when applied over sound rusted surfaces, must *penetrate* through rust to bare metal. Rust-Oleum does exactly that—as proved by radioactive tracing! Rust-Oleum's specially-processed fish oil vehicle was radioactivated and formulated into Rust-Oleum 769 Damp-Proof Red Primer—then applied to rusted test panels. Penetration *through rust* by Rust-Oleum's specially-processed fish oil vehicle was then traced by Geiger Counter.

You stop rust, because Rust-Oleum's fish oil vehicle *penetrates* to bare metal and into the tiny pits where it drives out air and moisture. You save money, because you can apply Rust-Oleum directly over sound rusted surfaces—usually eliminating costly surface preparations. Attach coupon to your business letterhead for thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists.


Radioactivity, per cent
Distance from Coating Surface, mils
Based on surface activity = 100%
Rust-Oleum Coating
Rust-Oleum Coating, some rust
Mixed, rust and Rust-Oleum coating
Rust, some Rust-Oleum coating
Mixed, Rust-Oleum vehicle, rust, and metal
Metal

Curved chart line shows Geiger Counter recordings of Rust-Oleum penetration at each mil level.



**Rust-Oleum Corporation**
**2527 Oakton Street, Evanston, Illinois**

Rust-Oleum is available in practically all colors, including aluminum and white. Prompt delivery from industrial distributor stocks.

# RUST-OLEUM®

# STOPS RUST!

See our Catalog in Sweets, or write for complete information.

There is only one Rust-Oleum—it is distinctive as your own fingerprint.

**ATTACH TO YOUR BUSINESS LETTERHEAD AND MAIL TO:**

**Nearest Rust-Oleum Distributor Shown at Right.**

☐ Complete literature with color charts.

☐ Thirty-page report on Rust-Oleum penetration.

## Contact Your Nearest Rust-Oleum Distributor Today!

### ARIZONA

**Alemite Stewart-Warner**
326 N. Third Avenue
Phoenix
Phone: ALpine 8-5721

### CALIFORNIA

**Barnes & Delaney**
Atlantic & Willow Sts.
Long Beach
Phone: LOng Beach 4-1647

**Ralphs-Pugh Co., Inc.**
530 Howard Street
San Francisco
Phone: SUtter 1-6505

**Republic Supply Co.**
2600 S. Eastland Ave.
Los Angeles
Phone: PArkview 8-7151

**Republic Supply Co.**
1919 Williams St.
San Leandro
Phone: LOckhaven 2-0414

**Sacramento Rubber Co.**
721-723 "J" St.
Sacramento
Phone: Gilbert 2-3847

**Valley Foundry & Machine Works**
2718 S. East Avenue
Fresno
Phone: 3-6135

### COLORADO

**General Supply Company**
127 E. Bijou Street
Colorado Springs
Phone: MElrose 2-8241

**George Brothers**
973 Broadway
Denver
Phone: TAbor 5-8747

**Stickney's, Inc.**
Ft. Morgan
Phone: 475

**Union Supply Co.**
5460 Colorado Blvd.
Denver
Phone: ALpine 2091

### IDAHO

**Western Equipment Co.**
4009 Fairview Ave.
Boise
Phone: 3-5401

### OREGON

**Barnum Tool Company**
3629 Franklin Boulevard
Eugene
Phone: 4-7363

**Standard Supply Co.**
934 S.E. Sixth St.
Portland
Phone: Vermont 2167

### UTAH

**Williamsen Body & Equipment Co.**
9th & Wall Sts.
Ogden
Phone: 2-7503

**Industrial Supply Co.**
121-135 Social Hall Ave.
Salt Lake City
Phone: 3-6727

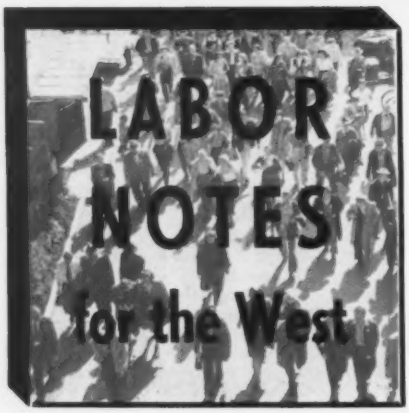
### WASHINGTON

**E. H. Holm & Company**
1016 First Avenue, S.
Seattle
Phone: Kenwood 5030

### WYOMING

**Wyoming Automotive Co.**
628 West Yellowstone
Casper
Phone: 3-6677

*. . . for more details, circle No. 13 on Reader Service Postcard*




**NEW APPROACH TO SUPERVISOR SHORTAGES,** instigated last fall, is a training course designed to develop plant management people from the engineering ranks. Sponsored by the American Society of Mechanical Engineers, Southern California Section, the first course received many more applicants than could be handled, so two more classes will be started in May—one in Pasadena and the other in Long Beach.

ASME has selected Floyd Graham & Associates, Los Angeles management-consulting firm, to conduct the courses. William C. Urlovic of that company will instruct the many students who, by the way, do not have to be ASME members to be eligible for training. Leaning heavily on the case-history approach to training, the course is entitled "Elements of Engineering Supervision—Case Histories" and covers structure and function in industrial organizations, increasing understanding as a prerequisite for leadership, semantics—facts versus sentiment in the work situation, problems of communication, and practical supervisory skills.

**WILLIAM C. URLOVIC,** graduate engineer with 16 years of industrial experience in both line and staff positions, and a consultant in management engineering at Floyd Graham & Associates, is instructor for the ASME engineering supervision training courses.

Fee for the 15-meeting courses, which are each limited to 40 students, is $42.50. The Pasadena section will meet at the Pasadena Athletic Club, Green Room, 425 East Green St., on Wednesday evenings starting May 9. Long Beach City College, Business and Technology Div., Room 207, 1305 East Pacific Coast Highway, will be the meeting place for the Long Beach section. Classes will be held for this section Tuesday evenings starting May 15. Where do you register? Contact O. H. Jacobson, 10249 Fourth Ave., Inglewood, Calif., or call the instructor, W. C. Urlovic at AXminster 1-1287 in Los Angeles.

•

**TELEVISION AS AN AID IN RECRUITMENT** is the latest technique being used by two Southern California electronic companies in their continuing search for scientific brain power. Consolidated Electrodynamics Corp. and ElectroData Corp., both in Pasadena, are co-sponsoring a nonfictional popular science program in an effort to attract engineers, technicians, and draftsmen to their firms.

Called "Adventure . . . Tomorrow," the weekly half-hour show unfolds in lay terms the latest advances of modern science. It is designed to appeal to the non-technical person as well as the engineer.

The opening show April 15 featured films of early V-2 rockets captured in Germany and an interview with Dieter Huzel, the man responsible for that historic rocket. Huzel, one of Germany's top rocket designers during World War II, is now with Rocketdyne, a division of North American Aviation. Other programs will dramatize operation units that intercept and strike down enemy bombers without actually seeing the planes, a slow-motion study of exploding bullets, and electronic instruments which sense more than fingers, see more than eyes, and move faster than minds. Check in on Channel 7, KABC Los Angeles, 10 to 10:30 p.m. on Sundays if you'd like to take a look.

•

**A CONTEST FOR APPRENTICES IN MANUFACTURING** skilled trades is being developed under the leadership of the California Metal Trades Assoc. and sponsored by the National Assoc. of Manufacturers. Present plans call for a series of contests beginning with local apprenticeship committees and proceeding through district, area, and statewide selections. The outstanding apprentice for the state in the manufacturing skilled trades will be selected by July 27 by a state selection committee, and presented with appropriate recognition and awards.

•

**HUGHES AIRCRAFT IS GOING TO TRAIN ITS OWN MEN** for better jobs, chiefly to develop badly needed electronics technicians, with a new apprentice training program announced by Robert Shank, Hughes Vice President of En-

Here's the Hughes plan: A three-year training program, consisting of 36 hours per week of on-the-job training, four hours per week in an electronics lab, and six hours of technical instruction in classrooms. About 60 men will begin the course in mid-June and, according to Hughes, it's the first such plan in the electronics industry.

•

**DAY-TO-DAY TALKS BETWEEN FOREMEN AND MEN** are being encouraged at Kaiser Steel Corp.'s Fontana plant as part of a new labor relations program. Idea behind encouraging such talks is not to go into grievances that are handled in accepted channels, but to bring up matters of general, departmental, or at times of more personal interest. It was agreed all around, by Kaiser plant managers and representatives of the United Steelworkers of America locals, that the new approach will do much to promote better labor-management relations.

The plan is formalized in a bulletin now being distributed to all employees. In detail here's how it will work: Foreman chats with every employee at every opportunity. Superintendent and grievance committeeman hold informal weekly meetings. Assistant general superintendent, superintendent of a department, and grievance committeeman meet once a month. And so on to higher levels of

. . . continued on page 22

*This half-inch National Cold Nut Former swallows .690" USS Manufacturers Wire like a giant strand of spaghetti. In five successive punches the machine forms a hexagon nut blank ready for threading. California Fasteners produce about a million hexagon nut blanks monthly at their Sonoma, California, plant.*

# Making bolts and screws requires special steel

If you own a Western-assembled Ford, your car is literally held together by California Fasteners. There are about 1300 standard bolts and screws needed to assemble a Ford. A big part of these needs are supplied Western assembly plants by CALFAST who make the 2" arm rest screw, bumper bolt, remote control door latch stud, body screw and wheel nut shown in the main picture above; from left to right.

CALFAST puts USS Manufacturers Wire to a series of severe tests in their thread forming and their cold heading operations. Yet rejects due to rough threading or split heads are practically nonexistent. California Fasteners gets the wire best suited to their needs—because the USS Manufacturers Wire they use is especially made for the production of bolts, rivets, screws, nuts, etc. USS Manufacturers Wire is available in more than 1,000 different types, grades and finishes to fit your own special needs.

***Free wire gauge!*** WI-5

UNITED STATES STEEL CORPORATION
COLUMBIA-GENEVA STEEL DIVISION
120 MONTGOMERY STREET
SAN FRANCISCO 6, CALIFORNIA

Please send me your free wire gauge that's fast and simple to operate; gives accurate measurements.

*Name*_____

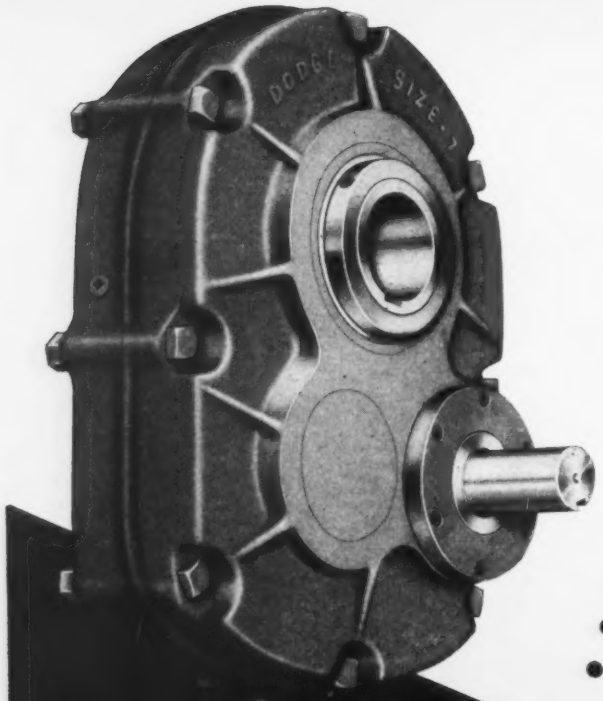
*Address*_____

*City*_____ *State*_____

*USS Manufacturers Wire*

UNITED STATES STEEL

*... for more details, circle No. 14 on Reader Service Postcard*




# 97% EFFICIENCY

- NO FOUNDATION
- NO FLEXIBLE COUPLING
- NO SLIDING BASE
- NO LINING UP PROBLEM

# —that's Torque-Arm

## THE DODGE SHAFT-MOUNTED SPEED REDUCER

Proved in tens of thousands of installations, in all types of industry, this new and better kind of speed reducer delivers up to 97% efficiency . . . makes savings up to one-third!

Mounted directly on the driven shaft, the reducer is anchored by the Torque-Arm, fastened to any fixed object. No need for foundation, flexible coupling or sliding base. No lining up difficulties. Unit is driven through any V-belt drive. Stock Taper-Lock Sheaves prescribed for each job. Tri-Matic Overload Release and Backstop available if desired.

Dodge Torque-Arm is America's most complete line of shaft-mounted speed reducers — single and double reduction series—capacities from 1 hp to 60 hp; output speeds of 12 to 365 rpm. Sold from Distributors' stocks.

**DODGE MANUFACTURING CORPORATION**
**6600 Union Street, Mishawaka, Indiana**

***Call the Transmissioneer,*** your local Dodge Distributor. He can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.

**DODGE**
*of Mishawaka, Ind.*

*. . . for more details, circle No. 15 on Reader Service Postcard*

# New Lightweight SKIL Sander For Production Plants Gives 30% More Power

SKIL's new Disc Sander, Model 851, is giving industry important help with finishing problems. Here is a tool that is lightweight and easy-to-handle . . . with extra power to meet bigger demands. In rugged on-the-job service, the new 851 proves that it can deliver more work on a variety of tasks . . . with far less maintenance than any comparable sander.

### These Are Some Of The Other Exclusive Features Offered By SKIL:

- **FASTER WORKING!** 30% more power and increased speed; gets maximum operating efficiency from all accessories.
- **EASIER HANDLING!** New compact design results in shorter length and lighter weight. Front and rear handles placed for best control.
- **LOWER MAINTENANCE!** Engineered for longer life. Large inspection plate permits easy cleaning and checking.
- **QUICK CHANGEOVER** of accessories permits easy switching from job to job including sanding, grinding, buffing, wire brushing.

***FREE!*** **Let your SKIL Distributor show you in a convincing demonstration and FREE trial . . . that "SKIL is the ANSWER" to your metal finishing bottlenecks! Write for information and literature.**

### Other Big Features Make SKIL Your Best Buy In Disc Sanders!

- **PRECISION-CUT GEARS** . . . mounted in rubber for smoother operation!
- **TOOL REST** . . . for added convenience!
- **CORD PROTECTOR** . . . for greater safety!
- **TRIGGER SWITCH** . . . for greater comfort in use!
- **SPINDLE LOCK** . . . makes accessory changes far easier!

SKIL
PORTABLE TOOLS
Made only by SKILL Corporation
formerly SKILSAW, Inc.
5033 Elston Ave., Dept. WI-56, Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario

*. . . for more details, circle No. 16 on Reader Service Postcard*

try the SLICK way...

over the Rockies

Western industry is learning how to reach profitable markets in the populous Eastern half of the U. S.—the quick way—the Slick way. It has found SLICK the inexpensive way, too, with rates comparable and OFTEN EVEN LOWER than surface freight. West Coast manufacturers like SLICK's all-cargo service—no delays or off-loading for passengers—equipment geared to cargo—big planes, big freight doors, mechanized speedy ground handling. They like SLICK's daily, transcontinental OVERNIGHT flights with on-time scheduled deliveries. They like the door-to-door service, the in-flight manifest that tells at any minute where your shipment is. They like the savings SLICK provides through reduced packing, lower inventory requirements, reliable delivery for production scheduling. In short, the West likes SLICK service! Call SLICK on your next airshipment anywhere! The SLICK WAY—is the QUICK WAY!

SLICK
THE AIR FREIGHT LINE
3000 N. CLYBOURN AVENUE, BURBANK, CALIFORNIA

*. . . for more details, circle No. 17 on Reader Service Postcard*

## LABOR NOTES

. . . continued from page 18

management-union meeting, occurring more infrequently.

Last October, during a work stoppage at Fontana, company and union men pledged themselves to working out a better method for handling situations that created serious grievances, with possibilities of work stoppage. Method whereby foremen talked with men has been tried since then. Since October, some 30 grievances have been sent back down the line to individual departments for such discussion, and have been solved at that point. Face-to-face communications on a daily basis in the various departments, it is hoped, will keep the grievances from ever starting up the line to begin with.

•

**FOR INFORMATION ON ENGINEERING EMPLOYMENT PRACTICES** a new monthly newsletter is now being published by the National Society of Professional Engineers. The newsletter, the first issue of which appeared in April, is directed to engineering and other industrial executives.

The publication will report significant progress with respect to professional development programs for employed engineers, decisions of the National Labor Relations Board and the courts affecting professional engineers, management's viewpoint related to improvement of engineer-employer relationships, and activities of governmental agencies in the employment practices field. It will also report comments and editorial opinions from leading journals concerning the problems of engineers in industry.

The National Society of Professional Engineers is made up of 36,000 registered professional engineers in all the technical branches.

If you want to receive the *Engineering Employment Practices Newsletter*, contact the Society at 2029 K St., Washington 6, D. C.

•

**WAGES WENT UP IN 95% OF 1955 SETTLEMENTS** in California collective bargaining agreements. This was revealed by a survey of 320 contract settlements, each affecting 500 or more California workers.

Total of 304 of the settlements provided for a general wage increase. For 204 of the wage increases, the amount of increase could be expressed as an average or flat cents-per-hour amount. One-half of these provided for an increase of at least 8½¢ per hour, and the range was from 2½¢ to 25c per hour.

Nearly one-half of the 320 settlements made changes in one or more of the principal wage supplements. Some 76 settlements established or changed a health and welfare plan; 71 established or changed a paid vacation provision; 39 added one or more additional paid holidays; 33 established or revised a pension plan; nine established or revised a paid sick leave plan, and only seven established a supplemental unemployment benefit plan.

More than 90% of these major settlements were negotiated at the conference table without any work stoppage.

For a complete copy of the report, titled *Wage Settlements Negotiated in Major California Union Agreements, 1955*, contact the State of California Dept. of Industrial Relations, Div. of Labor Statistics and Research, P. O. Box 965, San Francisco 1. There is no charge.

•

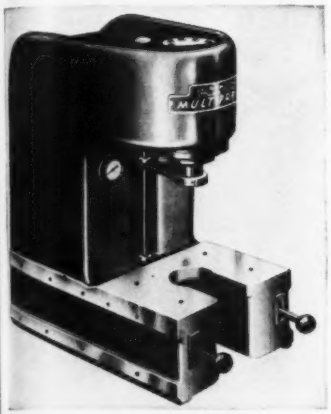
Another production improvement with

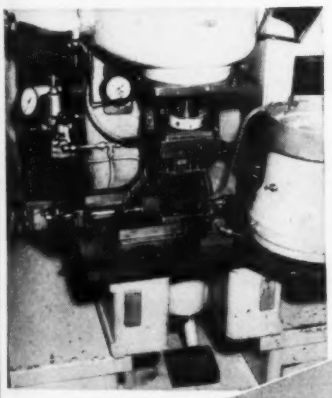
**DENISON**

***MULTIPRESS***

# Multipress® Automation turns out 48,000 assemblies a day

*Denison Multipress pierces, forms, cuts off, positions and spot welds stainless strap to washers*





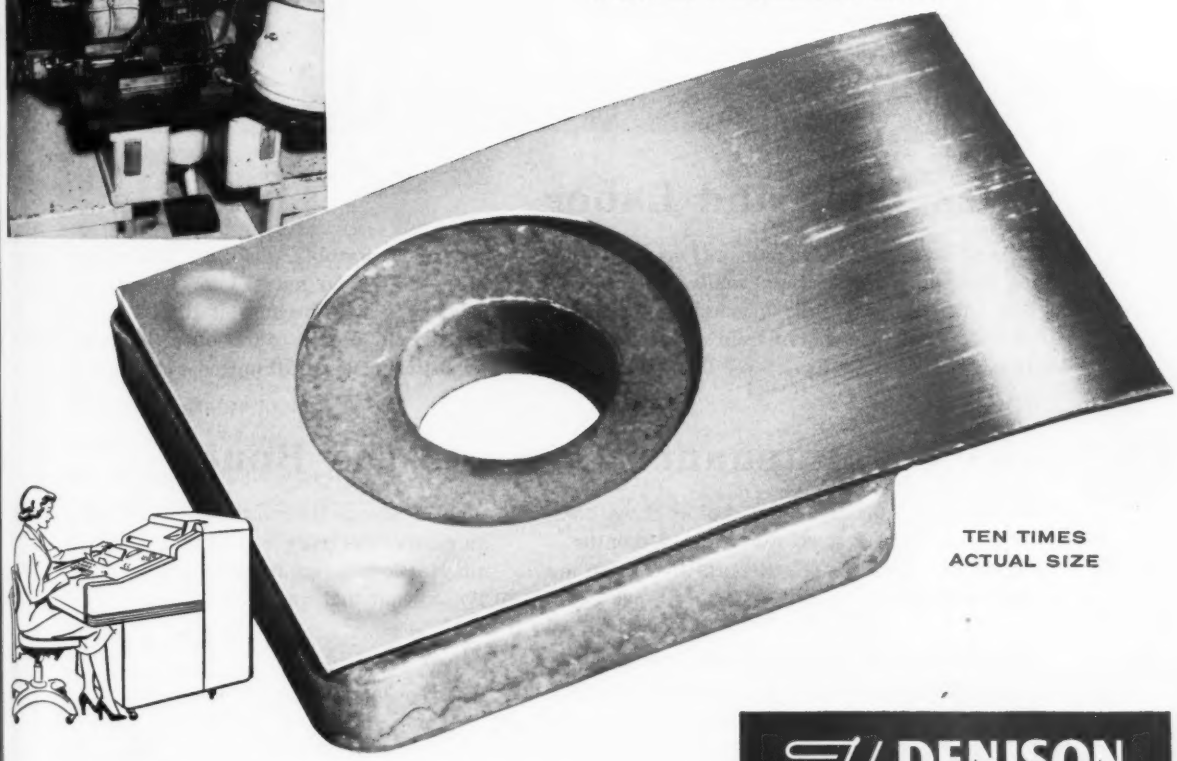
100 assemblies per minute . . . that's the production turned out by one Denison Multipress at International Business Machine Corporation, Poughkeepsie, New York.

Stainless steel tape is fed through a hitch feed into a punch and die set where it is pierced, shaped, and cut off forming a damper guard to cushion the action of a relay armature. It is then positioned under welding electrodes and welded to a square steel washer.

All operations are automatic . . . accurately timed to the stroke of the ram.

Ask a Denison field engineer to show you how to put Multipress to work in your plant. He will demonstrate exactly where and how you can save money on your operations . . . now. Write us.

**THE**
**DENISON ENGINEERING COMPANY**
1184 Dublin Road • Columbus 16, Ohio
*A Subsidiary of American Brake Shoe Co.*

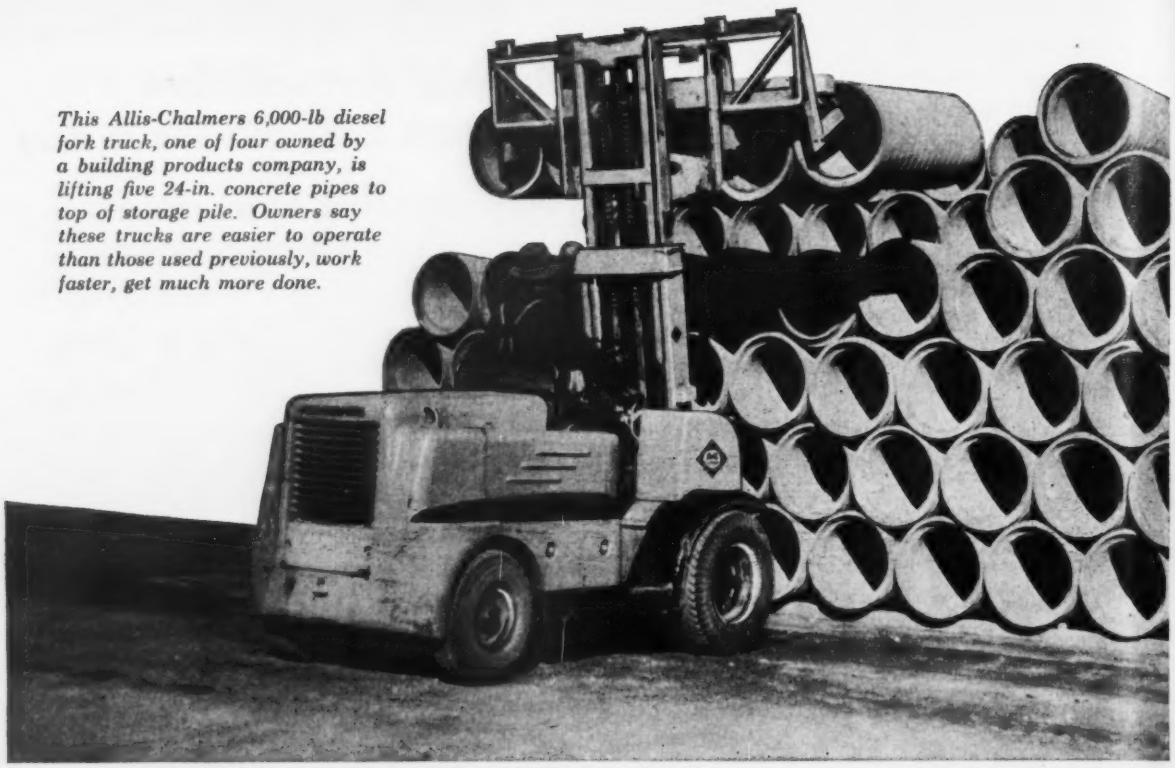


TEN TIMES ACTUAL SIZE

**HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS**

**DENISON** HydrOILics

*. . . for more details, circle No. 18 on Reader Service Postcard*



*This Allis-Chalmers 6,000-lb diesel fork truck, one of four owned by a building products company, is lifting five 24-in. concrete pipes to top of storage pile. Owners say these trucks are easier to operate than those used previously, work faster, get much more done.*

# You can expect double savings with an Allis-Chalmers Lift Truck

## 1 Saves Time and Labor

When you put an Allis-Chalmers Fork Lift Truck on the job, the first thing you'll notice is how fast and steady it works. One reason is the ease of operation. You mount from either side — no brake handle or shifting lever to interfere. The seat is comfortable, visibility is excellent. Handling is "second nature" to even the inexperienced operator, because it drives just like an automobile. Result of this operating ease: bonus quantities of material moved every hour.

## 2 Slices Maintenance Costs to the Bone

"It has gone 6,000 hours and still no downtime." "Up and down a steep ramp for 15 months — repair cost only $1.92." Reports like these are not uncommon, as Allis-Chalmers trucks continue to amaze their owners. When repairs *are* necessary, the truck can be disassembled in 22 minutes — stripped for servicing in 22 seconds. Think what that means in savings.

*Let your Allis-Chalmers material handling dealer show you the kind of savings this lift truck can give you. Write for free catalog.*

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

**ALLIS-CHALMERS**

BH-12

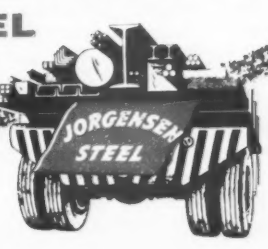
*. . . for more details, circle No. 19 on Reader Service Postcard*

# *Why Warehouse Steel?*

## call *Jorgensen* first!

You know the saying, "Let George do it!" Well, when it comes to steel—let Jorgensen do it! Yes, let Jorgensen pay the costs of storing, handling, insuring large diversified stocks of steel. Then, whatever you need in steel—carbon, alloy, stainless, tool and specialty stock—*call Jorgensen first!* Orders filled expertly and delivered promptly. Experts ready and able to advise you on short cuts and proper materials.

**EARLE M. JORGENSEN CO.**
**STEEL**




**LOS ANGELES**—10650 S. Alameda, LOrain 7-1122
**SAN FRANCISCO**—700 Pennsylvania Ave., MIssion 7-7800
**DALLAS**—2200 W. Commerce St., RIverside 1761
**OAKLAND**—1657 W. Grand Ave., HIgate 4-2030
**HOUSTON**—5311 Clinton Dr., ORchard 2-1621
**TULSA**—7311 East Pine St., TEmple 5-1511
**FORT WORTH**—Dial EDison 6-0578

**PLANT ENGINEERS INSTITUTE SHOOTS FOR 5,000 MEMBERS** who must be practicing plant engineers before 1960. One way of reaching this total was a recent mailing of extra application blanks to current members of the American Institute of Plant Engineers with a "boost" to get an individual "push" for new members from each of them. This mailing accompanied the spring, 1956 A.I.P.E. directory of organizations, but for the West the mailing only went to about 100 engineers who comprise the total membership of the San Francisco and Los Angeles chapters, the only present Western chapters of the organization.

**T. H. HARDGROVE,** plant engineer at Aerojet-General Corp., Azusa, Calif., is Western regional vice president of the American Institute of Plant Engineers, and president of the Los Angeles chapter.

WESTERN INDUSTRY readers, including hundreds of plant engineers not now in the group's present Western membership, should investigate the possibilities of this activity and the benefits available to groups that are bound to be formed soon in such industrial centers as Portland, Ore.; Seattle, Wash.; Salt Lake City, Utah; Denver, Colo.; Phoenix, Ariz., and others. Here are the vital statistics:

A.I.P.E. was organized in 1915 and its purpose is to "further the professional interests of plant engineers by: encouraging cooperative activities on a local and regional basis; establishing a central point of reference for members; fostering this specialized branch of engineering in the Western Hemisphere; and cooperating throughout the world with engineering organizations having similar objectives."

Present membership totals out at 1,000 and the group defines a practicing plant engineer as "one exercising responsible supervisory charge of, or executive responsibility for, all or some phase of design, layout, construction, operation, maintenance, and/or control of fixed and mobile facilities or plant." In short, a majority of WESTERN INDUSTRY readers.

We have predicted that many more chapters of A.I.P.E. are bound to get under way soon, but the group has a 'til-then proposition to benefit the right-now engineer. Provisions have been made for a membership-at-large for any member outside the area of an established chapter.

Western Regional vice president for the group and president of the Los Angeles Chapter, T. H. Hardgrove, Aerojet-General Corp., Azusa, Calif., can provide more information. San Francisco Bay Area engineers interested can contact L. J. Ghilardi, Hall Scott Motor Division, 2850 Seventh St., Berkeley, Calif., president of the San Francisco Chapter of A.I.P.E. Or, circle No. 300 on WESTERN INDUSTRY's Reader Service Postcard (page 67) and we'll be sure that you receive full information about the organization.

●

**INDUSTRIAL ENGINEERS INSTITUTE NOW COVERS THE WEST.** This was announced by Professor W. E. Ireson, Department of Engineering, Stanford University, at the annual Western Regional Convention of the American Institute of Industrial Engineers in San Francisco April 7.

**EXAMINING ENGINEERING EQUIPMENT** displayed at the American Institute of Industrial Engineers Western Regional Conference held April 6-7 in San Francisco are: (left to right) W. E. Ireson, regional AIIE vice president and professor of industrial engineering at Stanford University who opened the conference; W. R. Mellin, superintendent of work analysis, United Airlines, who spoke on clerical cost control; Charles Bogenrief, who heads up industrial and plant engineering at the Grayson Controls Division, Robertshaw-Fulton Controls Co., and spoke on "What should you get for your labor dollar?"; and W. J. Platt, assistant director of economic research at Stanford Research Institute, who spoke on industrial engineering procedures involved in the selection of land for industrial development.

His report revealed that, with the formation of new chapters in Salt Lake City, Utah, and Albuquerque, N. Mex., A.I.I.E. in the West is comprised of active units in every major population center in the West. Membership in the West has increased by 37% during the past year.

The many engineers who turned out for the 1956 event also learned that the 1957 conference will be held at the Hotel Del Coronado under the sponsorship of the San Diego Chapter.

●

**INCREASE SALES THROUGH Q. C.** is the adopted slogan for the 1956 Western Regional American Society for Quality Control Conference, scheduled for August 20-21 at the Statler Hotel in Los Angeles. The slogan was approved by the L.A. host chapter of A.S.Q.C. at the same time Kenneth R. Willhite of North American Aviation, Inc., was appointed chairman of the technical gathering.

Sponsored by A.S.Q.C.'s 16th region—chapters in Portland, Ore.; Seattle, Wash.; San Bernardino, San Diego, San Francisco, and Los Angeles, Calif.; Tuscon, Ariz.;

. . . continued on page 28

# There's an AIRCOMATIC® welding wire for you!

## Aluminum · Stainless · Nickel · Copper · Steel

Successful Aircomatic welding and Heliwelding (where filler metal is required) depend on using the correct wire. Airco can supply the widest variety of wire types and diameters – all specifically designed for use with these inert gas shielded welding processes. All Aircomatic wires meet rigidly controlled specifications as to chemical analysis, surface finish, cleanliness and packaging.

**Aircomatic Aluminum Welding Wires.** Supplied on 10 lb. expendable spools. New Type A finish for all high-quality work where X-ray standards must be maintained . . . scrupulously clean . . . bright finish . . . properly wound . . . smooth surface assures trouble-free feeding.

**Aircomatic Stainless Steel Welding Wires.** Supplied on 25 lb. expendable spools . . . excellent corrosion resistance . . . excellent tensile, ductility and impact properties . . . use to weld ordinary joints, apply stainless linings, build-up stainless overlays and join stainless clad materials.

**Aircomatic Nickel Base Welding Wires** are available in types to weld commercially pure Nickel, Monel and Inconel. These metals can also be overlaid on mild steel or other materials . . . Nickel wires supplied on 25 lb. expendable spools.

**Aircomatic Copper and Copper Base Alloy Welding Wires.** Use to assemble copper bus bars . . . fabricate copper or bronze vats . . . build-up worn propellers, piston and valve parts . . . supplied on 25 lb. expendable spools in both solid and stranded grades.

**Aircomatic Steel Welding Wires.** Grades available for welding mild steel, armor plate and for overlays and welding hardenable steels . . . supplied on expendable spools, chip board cores, catchweight coils, or in Wirepaks.

***Consult your nearest Airco Representative for technical or metallurgical information.***

*AT THE FRONTIERS OF welding PROGRESS YOU'LL FIND . . .*

WELDING SHOW

**VISIT OUR BOOTH**

AIRCO®

**AIR REDUCTION PACIFIC COMPANY**

SAN FRANCISCO • LOS ANGELES • PORTLAND • SEATTLE
San Diego · Bakersfield · Fresno · Emeryville · Sacramento · Tacoma

*Western Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories*

Air Reduction Pacific Company is a division of Air Reduction Company, Incorporated. Principal products of other divisions include: PURECO – carbon dioxide, liquid-solid ("DRY-ICE") • OHIO – medical gases and hospital equipment • NATIONAL CARBIDE – pipeline acetylene and calcium carbide • AIRCO – acetylenic chemicals • COLTON – polyvinyl-acetates, – alcohols, and other synthetic resins.

*. . . for more details, circle No. 20 on Reader Service Postcard*

# You've never seen a pipe vise handy as this 40A Tristand

# by RIDGID

**with built-in folding tray...**

all one unit, no loose parts, easy to set up or fold up for carrying . . . and tray makes it rigid as a stubborn mule!

**Vise overhangs front legs** so threader handles swing clear . . . Extra light, strong . . . Big vise base, pipe and conduit benders, pipe rest, tool slots, ceiling brace screw . . . efficient vise with LonGrip jaws—it's got everything!

Every RIDGID Pipe Tool TESTED individually before shipment
Pats. applied for
Made also with 4" chain vise No. 45A
See and try 40A Tristand, ⅛" to 2½", at your Supply House!
"Threaded Pipe— It's Tight—It's Best —Costs Less"
RIDGID
Work-Saver Pipe Tools

**The Ridge Tool Company** **Elyria, Ohio, U.S.A.**

*. . . for more details, circle No. 21 on Reader Service Postcard*


## WESTERN MEETINGS

. . . continued from page 26

Salt Lake City, Utah, and Japan—this is the third regional conference in the West.

**KENNETH R. WILLHITE** of North American Aviation, Inc., Los Angeles, is chairman of the 1956 Western Regional ASQC Conference, scheduled for August 20-21 in Los Angeles.

To smooth out the presentation of the many technical papers to be delivered, the conference will be divided into three sections, an aircraft and missile division, a technical division, and a general development division. Advance notices of papers to be delivered at each section meeting will be sent out in June. Watch for them, Q.C. experts. It will provide opportunity to plan your time to get the most out of the mass of technological and application information at the event.

More information and registration data can be obtained by contacting A.S.Q.C., 8021 Stewart Ave., Los Angeles 45, Calif.

•

**THE HEAT'S ON** and a three-day symposium on methods, materials, and processes involved in the uses of high temperature in industry and science will show more than 300 industrial and scientific people (including you?) how to use it and what to expect. Jointly sponsored by Stanford Research Institute and the University of California, and entitled "High Temperature—a Tool for the Future," the symposium is scheduled for June 25-27 on the University's Berkeley, Calif.. campus.

Co-chairmen leading the conference will be Leo Brewer, professor of chemistry, and Allan W. Searcy, associate professor of ceramic engineering, University of California; and Nevin K. Hiester, manager, chemical engineering section Stanford Research Institute. More information can be obtained by inquiry addressed to Mr. Hiester at SRI in Menlo Park. Calif.

•

## MEETINGS YOU SHOULD PLAN TO ATTEND

**May 21-23—NORTHWEST ELECTRIC LIGHT & POWER ASSOC.,** business development section, convention, Benjamin Franklin Hotel, **Seattle, Wash.**

**Aug. 21-24—WEST COAST ELECTRONIC MANUFACTURERS' ASSOC.** and **INSTITUTE OF RADIO ENGINEERS** (seventh region), Western Electronic Show and Convention, Pan-Pacific Auditorium, **Los Angeles.** Contact Herbert Cerwin, WESCON, 344 N. La Brea Ave., Los Angeles 36, Calif.

**Sept. 10-12—AMERICAN SOCIETY OF MECHANICAL ENGINEERS,** fall meeting, **Denver, Colo.** Contact A. A. Woodward, Public Service Co. of Colorado, 5525 E. 38th St., Denver.

. . . continued on page 32

## Pacific Telephone & Telegraph Company used

# WROUGHT IRON PIPE for this Radiant Heating System

This radiant heating system, serving 22,500 square feet of floor area in Pacific Telephone & Telegraph Company's new warehouse at San Leandro, California, is an excellent example of the Company's insistence on durability. More than 16,300 feet of corrosion-resistant wrought iron pipe was used to safeguard the system against premature failure and costly repair.

The system, planned and designed by PT&T's Engineering Department, features some interesting construction details employed to protect the floor against damage from heavy fork-lift trucks and impact caused by bouncing reels of cable. After the 10-inch structural slab was poured, wrought iron pipe coils were laid in place. Over the pipe coils, a wire mesh was stretched to strengthen the concrete "topping" slab, and contribute to more even heat distribution. Then the pipe and mesh were covered with 3 inches of concrete. A metallic floor hardener was applied to the surface.

Architects for the project were Thomsen & Wilson, San Francisco. The system was designed by Harry S. Haley, San Francisco Consulting Engineer, in collaboration with Pacific Telephone & Telegraph Company engineers. The installation was made by Scott Co., Bay Area Mechanical Contractors.

Wrought iron pipe is ideally suited for this service because of its ease of installation, dependability in service. It takes short radius bends, without spring-back. It produces sound welds, free from pin-hole leaks. Its uniform structure assures sharp, full-depth threads. And because of its mechanical strength, wrought iron pipe withstands damage during installation. In service, wrought iron stays on the job longer, costs less per year.

Our bulletin, *Wrought Iron Pipe for Radiant Heating*, gives complete details, documents service records. Write for a copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N. Y.

*Available throughout the world.*

**BYERS**

CORROSION COSTS YOU MORE THAN WROUGHT IRON

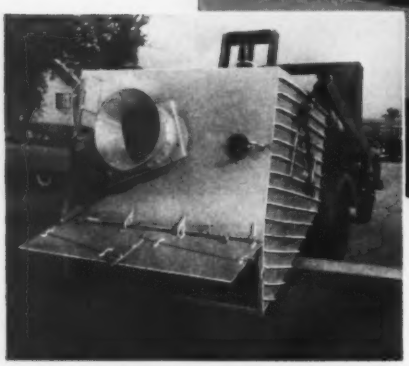
**WROUGHT IRON**

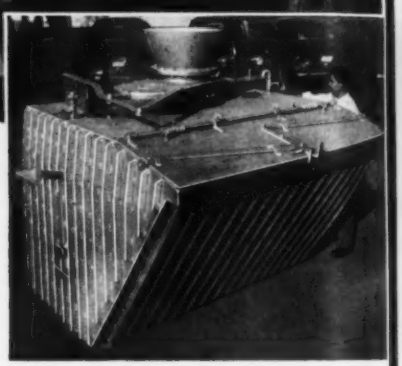
**TUBULAR AND HOT ROLLED PRODUCTS**

ELECTRIC FURNACE QUALITY STEEL PRODUCTS

*. . . for more details, circle No. 22 on Reader Service Postcard*

# These 4 save $ h

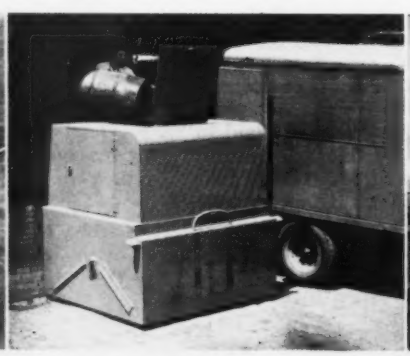




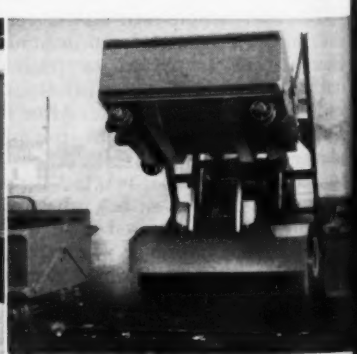
**Dempster-Dumpster serving a 6 cu. yd. container with cooling fins for handling a high temperature product.**

Here are a few of the hundreds of Detachable Containers we have built to solve handling problems of every description. A few others not shown include those with compartments . . . with insert containers . . . fully-insulated . . . lined with lead . . . lined with fire brick . . . with windows and doors . . . with casters . . . flat bottoms and open at one end . . . with teeth . . . with shelves for tools and supplies—and we could describe hundreds more all served by one Dempster-Dumpster and only one man, the driver.

**This 3 cu. yd. Container has skids for fork lift truck transfer.**



**10 cu. yd. Container widely used for refuse and combustible wastes.**



**Flanged wheel equipped containers for remote loading.**

5176

**DEMPSTER B**

# 4 manufacturers to $82,000.00 annually handling waste materials!

## These four industrial plants expect to save, in labor costs alone, during the first five years service of the Dempster-Dumpster System—

A PLASTICS PLANT: $26,958.00 savings on an investment of $9,523.50 in Dempster-Dumpster equipment. Savings alone pay for equipment in two years.

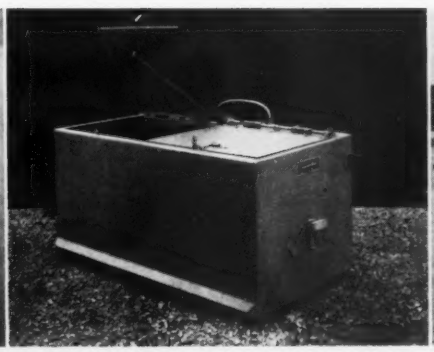
A CHEMICAL PLANT: $204,076.75 savings on an investment of $40,968.00 in this equipment . . . savings pay for equipment in one year.

AN AUTOMOTIVE PLANT: $135,000.00 savings on an investment of $19,272.00 . . . savings pay for equipment in 9 months.

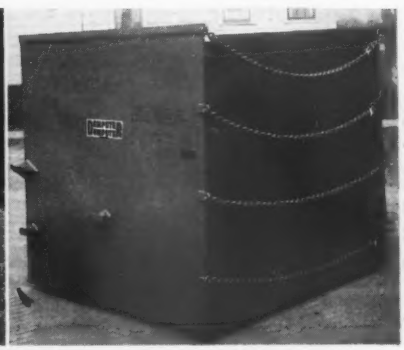
A PAPER AND PULP MILL: $43,104.00 savings on an investment of $10,750.00 . . . savings pay for equipment in 1¼ years.

Those are typical examples. Visualize a Dempster-Dumpster, operated by only one man, the driver, serving scores of big steel containers, one after another, in your plant. Containers of many designs and types, handling waste or salvable materials, raw or finished products, fluids including acids, combustibles, dusty materials—anything that can be handled in up to 21 cu. yd. detachable Dempster-Dumpster Containers . . . payloads up to 19 tons. Savings are tremendous! Take advantage of our free engineering service, which determines by fact-finding survey the cost cutting possibilities of this system in your plant. Dempster Brothers, Inc.

600 Gal. stainclad tank with brine cooling channels.



A Container available up to 10 cu. yds. with or without lids for many uses.



A 9 cu. yd. container for handling packaged products.

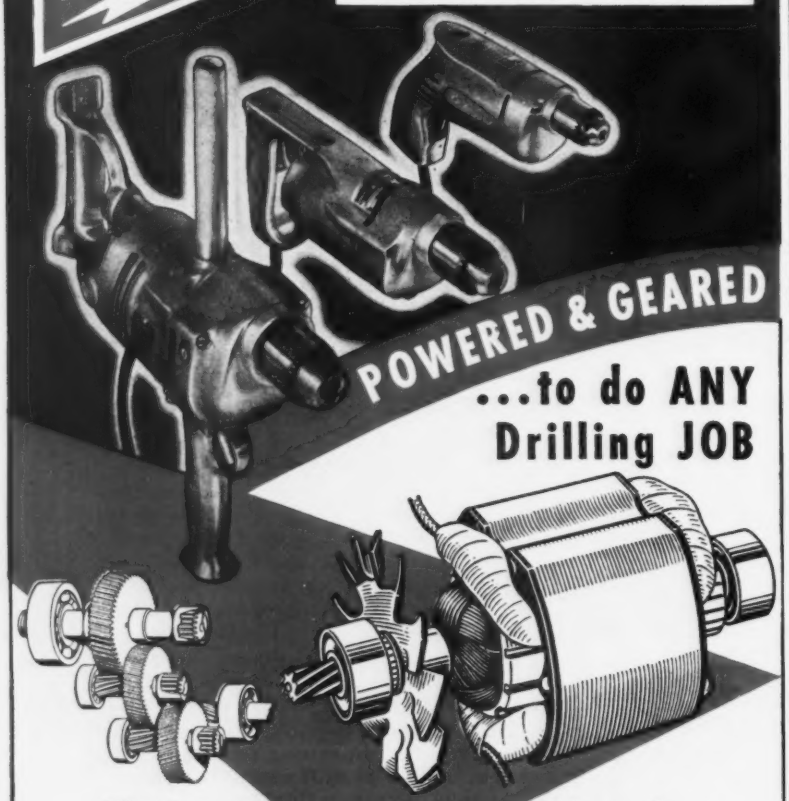
**DEMPSTER BROTHERS** 556 N. Knox, Knoxville 17, Tennessee

*. . . for more details, circle No. 23 on Reader Service Postcard*

RUGGED . . . DURABLE

POWERFUL!

Milwaukee Industrial ELECTRIC DRILLS



POWERED & GEARED

. . . to do ANY Drilling JOB

*Ball and Roller Bearings Throughout*

(no sleeve bearings used anywhere)

Your Choice of **28** DRILL MODELS

WE BUILD OUR OWN MOTORS

**. . . and Have Been for Over 30 Years.**

Every MILWAUKEE Electric Drill Motor is designed, manufactured and assembled in our own plant. Complete co-ordination of design, control of materials and manufacture makes it possible for us to build a *better* motor. . . . It enables us to assume undivided responsibility for the entire tool . . . to assure the kind of *power*, spindle *speed* and drilling *torque* you can *depend* on . . . the kind that Pays Off BIG for you, in increased production, less maintenance and longer tool life.

***Write for Complete Free Catalog G-7***

MILWAUKEE ELECTRIC TOOL CORP.

LOS ANGELES
1569 W. Olympic Blvd.

SAN FRANCISCO
1552 Howard Street

SAWS • SANDERS • GRINDERS • HAMMERS • SCREW DRIVERS • POLISHERS • DRILLS

Main Plant and Office . . . Milwaukee 8, Wisconsin


## WESTERN MEETINGS

. . . continued from page 28

**May 14-16—PACIFIC COAST ELECTRICAL ASSOC.,** annual convention, Last Frontier Hotel, **Las Vegas, Nev.** Contact V. W. Hartley, 530 W. Sixth St., Los Angeles 14.

**May 16-20—NATIONAL PAPER BOX MANUFACTURERS ASSOC.,** Hotel Mark Hopkins, **San Francisco.** Contact G. L. Nordstrom, executive secretary, Liberty Trust Bldg., Philadelphia 7, Pa.

**June 25-27—HIGH TEMPERATURE—A TOOL FOR THE FUTURE,** three-day symposium on methods, materials, and processes involved in uses of high temperatures in science and industry, sponsored jointly by Stanford Research Institute and University of California, at UC **Berkeley, Calif.,** campus. Contact Nevin K. Hiester, Stanford Research Institute, Menlo Park, Calif.

**June 25-29—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS,** Fairmont Hotel, **San Francisco.** Contact H. H. Henline, secretary, A. I. E. E., 33 W. 39th St., New York 18, N. Y.

**July 10-12—6TH WESTERN PACKAGING AND MATERIALS HANDLING EXPOSITION,** Pan Pacific Auditorium, **Los Angeles.** Contact Clapp & Poliak, 759 Monadnock Bldg., San Francisco 5.

**Aug. 5-7—NATIONAL INDUSTRIAL COUNCIL (INDUSTRIAL RELATIONS ASSOCS.),** Sheraton-Palace Hotel, **San Francisco.** Contact Donald L. Mewhinney, director of public relations, 918 16th St., Washington 6, D. C.

**Aug. 6-8—SOCIETY OF AUTOMOTIVE ENGINEERS, San Francisco.** Contact E. W. Rentz, Jr., Western branch office manager, 714 W. Olympic Blvd., Los Angeles.

**Sept. 4-14—INTERNATIONAL ASSOC. OF MACHINISTS, A.F.L., San Francisco.** Contact Eric Peterson, secretary-treasurer, Ninth St. and Mt. Vernon Pl. N.W., Washington 1, D. C.

**Sept. 11-13—PACIFIC COAST GAS ASSOC. ANNUAL MEETING,** Hotel del Coronado, **Coronado, Calif.** Contact Assoc. offices, 2 Pine St., San Francisco 11.

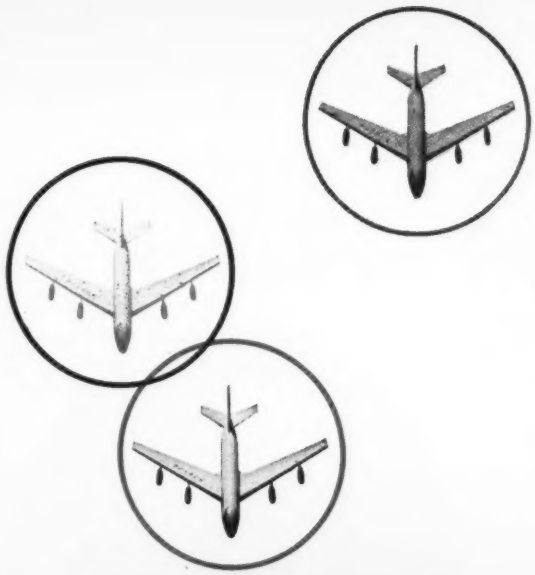
**Sept. 16-22—AMERICAN SOCIETY FOR TESTING MATERIALS,** 2d Pacific Area National Meeting and Apparatus Exhibit, Hotel Statler, **Los Angeles.** Contact Bert Folda, chairman, promotion and publicity committee, c/o General Petroleum Corp., Box 2122, Terminal Annex, Los Angeles 54.

**Sept. 17-21—SYMPOSIUM ON RADIATION EFFECTS ON MATERIALS,** sponsored jointly by Atomic Industrial Forum and American Society for Testing Materials, **Los Angeles.** Contact ASTM, 1916 Race St., Philadelphia 2, Pa.

**Sept. 19-21—PORCELAIN ENAMEL INSTITUTE, INC.,** 25th annual meeting, The Broadmoor, **Colorado Springs, Colo.** Contact Porcelain Enamel Institute, 1145 19th St. N.W., Washington 6, D. C.

**Want further info about any meetings listed above? Write: Editor, Western Industry, 609 Mission, San Francisco.**

*. . . for more details, circle No. 24 on Reader Service Postcard*



A tribute to American engineering skill, the world's largest privately owned wind tunnel at Boeing's Seattle plant has played a major role in the development of such famed aircraft as the B-47 Stratojet, the B-52 Stratofortress and the 707 Jet Stratoliner.

The tunnel represents an investment to Boeing of well over $2,000,000. Its drive machinery is protected throughout by General Petroleum lubricants developed in Flying Red Horse laboratories.

Your plant, too, can have the added protection demanded by the West's leading industrial firms. Call your nearest G.P. office today for the tops in products and service.

2-1044

*. . . for more details, circle No. 25 on Reader Service Postcard*

# hollow or solid

## a steel tube or bar for every purpose

### TUBING: SEAMLESS AND WELDED

Whatever your tubing requirement—whatever kind and quantity you need—you can get quick delivery of a quality product with a single call to Ryerson.

That's because Ryerson stocks are the nation's largest, including more types and sizes, more tonnage, than any other source. And Ryerson service facilities are unequalled, too.

Hack saws, band saws and equipment for production lathe cutting and chamfering assure quick service on your orders. In addition, a staff of tubing specialists puts years of experience to work on your problems of tubing selection and fabrication. So call Ryerson for everything in tubing and tubing service.

In stock: Cold drawn and hot rolled seamless mechanical tubing, hot and cold rolled welded tubing, hydraulic and cylinder tubing, structural tubing, etc.

### COLD FINISHED BARS

Careful handling, accurate cutting, vigilant inspection—these are just three of many ways in which Ryerson assures you of the highest quality in cold finished bars.

Stored in temperature-controlled rooms, spark-tested to guard against mixed steels, Ryerson cold finished bar stocks include rounds, squares, hex's, flats—screw steel, accuracy stock, turned, ground and polished shafting, Ledloy for fastest machining—everything you need. And even the hard-to-get intermediate sizes are on hand.

To help you select the best cold finished bar for each application, we have just published a simplified guide showing the comparative strength, cost, machinability, workability, etc. of all commonly used types. Write for your copy and call Ryerson when you need high quality cold finished bars.

# RYERSON STEEL

In stock: Bars, structurals, plates, sheets, tubing, alloy and stainless steel, reinforcing bars, machinery & tools, etc.

JOSEPH T. RYERSON & SON, INC.

LOS ANGELES—Plant: 4310 E. Bandini Blvd. Mail: Box 3817, Los Angeles 54. Phones: ANgelus 2-6141, from San Diego, (no toll) ZEnith 6660.
SAN FRANCISCO—Plant: 65th & Hollis Sts., Emeryville. Mail: Box 188, Emeryville, California.
Phones: OLympic 3-2933, DOuglas 2-4211.
SEATTLE—Plant: 1200 - 4th Ave. South. Mail: Box 3525, Seattle 24. Phone: SEneca 2300.
SPOKANE—Plant: North 207 Freya St. Mail: Box 2158, Spokane 10. Phone: KEystone 9311.

*. . . for more details, circle No. 26 on Reader Service Postcard*

Western Industry
MAY 1956

# How to develop effective managers in the West's small plants

**Here is extremely timely help for you on today's keenest problem in Western plants—developing the greater management abilities needed at all operating levels to keep new and expanding production lines rolling. You, as a Western plant manager, superintendent, or department head have a vital responsibility in learning and applying the proven techniques described on these pages. For successful performance tomorrow, you must today know . . .**

IN SMALL COMPANIES, which are predominant in the West, the number of business failures attributed to inadequate management points up very clearly the importance of developing effective managers.

The small company does not usually have a large supply of potential management personnel. Neither can it usually afford any extensive turnover of people hired for training programs and weeded out by competition.

The problem, then, becomes one of improving the performance of the individual who occupies each management position, and concurrently developing within these same people the necessary broader and higher management abilities which are prerequisite for greater responsibilities.

Let's look first at improving present performance. Performance of the individual manager depends on at least three major factors: the circumstances under which he works, the skills which he can apply to the job, and his motivation.

First, the circumstances. The fundamental circumstances on which all others depend are the objectives of the organization, and the overall objectives of management. These should be stated. Most statements in enlightened organizations today will include the basic ideas of service, satisfaction to those involved, and the positive aspect of leadership or direction. Such statements are broad ones, representing an ideal, and perhaps in detail unattainable. But only by knowing what our ultimate objectives are can we be sure that every step taken is taken in the right direction.

Certainly, these overall objectives of an organization are not enough for a manager to use in

## AUTHOR OF THIS ARTICLE

**HARRY M. HOPKINS**
Vice President in
Charge of Operations
Tool Steel Gear & Pinion Co.
Cincinnati, Ohio

**It is seldom that WESTERN INDUSTRY publishes material prepared by men who are not Westerners or with a locale other than in a Western plant. This article is an exception, and an appropriate one.**

**Mr. Hopkins traveled to San Francisco early this year to discuss his subject before the general management conference of the American Management Assoc. In preparing his material, he exhibited a remarkable insight into the problems plant operating management men in Western manufacturing plants currently have in developing effective managers all along the line in a new and expanding industrial region.**

**A few hundred men heard his talk in San Francisco; many thousands of Western plant operating executives should have heard it. That is why WESTERN INDUSTRY has adapted his remarks and presented them here for the benefit of its readers throughout the 11 Western states.**

improving performance, so it is necessary to set intermediate goals. We all work best when we are working for a definite goal and a goal which we have a reasonable chance of approaching closely. These goals constitute a standard of performance.

In order to make any standard effective, measures of performance should be provided wherever possible. These need to be as objective as possible, and they must be available to the individual whose performance they measure. It is both right and effective that each manager be able to measure his own performance using the same results and records which are available to his superiors to measure his performance.

**"A clear understanding of authority and a clear definition of authority go a long way. . . ."**

The next factor of circumstances has to do with the clarity of the organization. Most people in any organized activity want to cooperate. A lack of cooperation more frequently comes because of circumstances that prevent cooperation than comes from a lack of desire on the part of people to cooperate. A very clear understanding of responsibility and a clear definition of authority go a long way toward making circumstances such that people can cooperate.

Nearly disastrous failures of cooperation can occur when two individuals in an organization fairly well agree on the ultimate objective, but disagree, sometimes violently, on who is responsible for establishing the methods which will be used in working toward that objective. Clear statements of each manager's responsibility and a clear definition of the scope of his authority can go far toward eliminating this kind of misunderstanding.

The next factor of circumstances has to do with the point at which decisions are made. In any organization there are many problems to be solved and many decisions to be made. In most cases the quality of the decision is materially affected by the facts which are brought to bear upon the decision.

Most facts which have a bearing on the problem are usually available and understood best at or near the problem level. Similarly, speed of decision is achieved when the decision can be made as closely as possible to the point where the problem arises. Every supervisory manager should be allowed to make every decision which he is able to make, because he is closest to the problem if it arises in his department and therefore presumably can make the quickest and best decision. This continuous emphasis on, and practice in, carrying full responsibility and making one's own decisions is one of the most important factors of management development.

This objective requires that you do two things. It requires first that you have clearly written statements of policy so that decisions which are made and which are governed by (or which affect) policy, will tend to be the same kind of decisions which would be made if the problems were carried higher in the organization for solution. Here is a good opportunity to develop managers.

**"The superior should allow subordinates to make the mistakes which go with their own decisions."**

When my firm started in, some years ago, to write a policy manual, we made our entire management group a part of the act. First, we assigned a staff man the job of listing alphabetically every subject on which we seemed to have some policy (written or not—complete or not). This list was submitted to all supervisors and executives, with the request for them to add every additional subject which *should* be covered. Tentative written statements were developed for each subject; some by individuals who seemed best informed in the area; some by special assignment committees; and some through discussion in large groups, such as all foremen. The next step was to discuss, amend if necessary, and get approval for, *each* written statement from the large groups of factory supervisors.

This is a very effective means of broadening thinking. By the time each supervisor has thought through, for example, the *intent* of a vacation policy, the philosophy of whether vacation is added compensation for past work or is preparation for work ahead, the cost factors, the merits of a plant shutdown period versus the needs of customers for emergency help, etc., he is a much better exponent of the policy than if he had merely been handed the policy to administer—and he has learned a lot about the interrelation of various factors and objectives of the management job.

This manual is now used periodically as a study and discussion outline, to bring new supervisors along, to refresh the understanding of the older ones, and to find spots where policy needs revision, or administration need improving.

The second thing which must be done to get these problems solved at the proper level is to create this pattern throughout the management. It is all well and good to talk

about teaching individual managers to make their own decisions, but no way has been found to actually train people to do this except by example from the next higher level of supervision.

This is an area of management which is easy to talk about, and in which it is difficult to perform well. It requires that each individual manager refrain from giving *answers* to his subordinates when they bring problems to him. Rather it requires that he take the time to help the subordinates think their problems through and arrive at their own decisions and the steps necessary to carry them out. It further requires that the superior be willing to let his subordinates sometimes make the mistakes which go with their own decisions and to learn from those mistakes. A further requirement implied here is that the superior be prepared to assume the responsibility for the actions of his subordinates, when results are bad as well as when results are good.

**"The small company can derive tremendous benefits from participation in association activities."**

Still another of the important circumstances has to do with the effectiveness of communications of current information to each manager. If people are to be alert, to anticipate problems before they arise, and to make regular contributions to progress, it is surely important that they have regular and effective means of keeping apprised of what is new in the organization in the way of problems, programs, possibilities, etc. It is one of the advantages of the small company that the entire management group can be easily reached with person-to-person communications on company information of every kind.

Skills in a smaller plant are necessarily both technical and managerial. The technical skills required at different management levels and in different types of organization activities are as wide as the total range of human endeavor. One of the standard problems in the small organization is having management people put in the necessary amount of time and effort in keeping abreast of what is new. A definite and strong encouragement of regular reading and regular participation in professional association activities is indicated in this connection. The small company can derive tremendous benefits from these outside associations, so the wise company will pay all the bills.

Earlier, objective performance standards were mentioned as providing perhaps the best single means of pinpointing the need for technical skills training for managers. These standards, and the feed-back to the individual of performance against these standards, also provide the incentive for the individual to want to acquire the training in skills.

**"Have each manager write down decisions he is expected to handle with each of the three kinds of authority."**

Managerial skills are important all along the line. One of the first of these might be termed organizational skill, and this could be equated practically to a clear-cut understanding of one's own authority, where it applies, and what type of authority it is. We have talked earlier about clear-cut definitions of responsibility and authority as being one of the circumstances affecting performance. Having clear-cut definitions available, and having each individual manager understand them clearly, however, are two different things. An interesting and useful device for occasionally testing the overall organizational skill of every manager is to have each one outline in writing the kinds of problems or decisions which he is expected to handle with each of three kinds of authority.

The first kind of decision is that in which he has the authority to decide and take action without consultation or reporting to anybody else. The second, the decision which he has the authority to make, but with a responsibility for reporting the action to his superior after he has taken it. The third kind is where he has the responsibility for seeing that a decision is made and action is taken, but only after consultation with his superior. A cross-checking of a manager's understanding of these matters with his superior's understanding quite frequently brings out some disagreements and points up some lack of organizational skill which needs to be rectified.

A year ago, my firm used another approach to this problem. We use a consulting psychologist one day per week on problems of testing, selection, communications, safety, etc. He was assigned to interview a representative and sizeable cross-section of the management group. This was an interview in depth, relatively unstructured, and aimed essentially at the question, "What obstacles are there which prevent or hinder your doing your job the way you want to do it?" This man has the confidence of our personnel, and he is a skilled interviewer.

The answers he received were classified and summarized in a report to top management, and pointed clearly to some needed clarification of policy, changes of organization structure, and closer follow-up of some procedures. Top management was not exempt, and got a clear look at itself from below. For example, too many top executives away from their jobs on outside activities for community, government, etc., so much of the time, had caused unnecessary and undesirable delays in getting some decisions made that could be made only at the top level.

**"It is essential that small plants utilize to the fullest available sources for information and training."**

At this point it is now appropriate to discuss the development in managers of various specific managerial skills, such as selection of people, establishing and using controls, and the review and appraisal of performance, as well as the human relations skills of management and the whole area of motivation of managers. It is at this point and in a discussion of these questions that we begin thinking of improving present performance, and preparing for future larger performance, in the same terms. Let's look here at some particular methods of developing managers, what's good and what's bad about those methods, and why.

In regard first to the development of some of these additional management skills, it should be recognized that it is impossible for the small company to be self-sufficient. It is essential that the small plant utilize to the fullest the available sources for information and training, such as schools, trade and professional associations, and visits to other companies. Fortunately for my firm, we are located in a metropolitan industrial area where there are very helpful programs of study available at the public night schools and the university evening programs. Our men also have access to membership and participation in the activities of a multitude of technical and management associations.

However, even for those companies not similarly located in such an area there are many effective sources of help available. To cite some, the concentrated, short-term, full-time management training programs presented by many

universities in many parts of the country, conferences and clinics on both the specific and general areas of management conducted by many organizations, and work-shops in management subjects conducted by many organizations.

**"Management attitude toward training programs has an important bearing on their success."**

Some small companies (and larger ones, too) say, "Our people are too busy to spare right now." But a more positive attitude is that any man worth such training will always be busy, and will always be missed when he is off the job, but that nothing he could be doing on the job is more important than broadening his viewpoint and developing his managerial skills in preparation for the future. In addition, there are a number of excellent management information services and publications which can provide the necessary flow of fresh ideas and repetition of necessary old ideas and can be used to form the material content of in-company discussion programs and conferences. We find that most other companies, both large and small, welcome a request from us to exchange inspection and discussion visits between supervisors and managers—both individually and in small groups, and are happy to cooperate in such efforts.

The management attitude within a company toward these training programs has a very important bearing on their success. To achieve maximum results the attitude should not be one which would be expressed by the questions, "How are you *enjoying* this activity?" or "What do you *think* of this activity?" but rather should be exemplified in the question, "*What* are you *getting* from this program or activity?" That is, the attitude should be commonly held and commonly expressed that these activities are intended to furnish the individual with practical and useful knowledge, or are intended to actively affect his viewpoint or his actions.

It has been our experience in the small company that attempting to develop management people by creating positions and programs solely for that purpose has not been very successful. For example, we tried selecting a group of potentially promotable people, detaching them from their regular jobs, and putting them on a rotating circuit of observation and understudying of supervisors or managers of various departments. This was unpopular, expensive, and relatively unsuccessful. This was a case where the trainees filled a supernumerary or extra position in each section of the organization and were therefore *marked* as trainees and could not be actually subjected to the measurement by results which is so essential to any appraisal of management progress.

**"Rotating management personnel at lower level jobs, foremen and up, has many desirable effects."**

By contrast, we have found it to be a very effective procedure to transfer individuals from one department or division to another, putting them into a regular and essential job in the organization, letting them learn to carry the full authority and responsibility of that position, be measured by the results achieved, and then transferred laterally to a different activity for the broadening experience which results.

Last fall, the job of general foreman of all heat treating at our plant was left open when the incumbent was promoted to chief metallurgist. Currently, the first of three younger metallurgical engineers from the staff department is doing that job for a period of six to nine months. After the other two have been rotated through the same position, one of the three will be permanently appointed. All three have been rotated through the "assistant to" position in the past, but now each will carry in turn the full responsibility, and be measured by the results. Naturally, they fully understand what is going on. They welcome the opportunity to grow, and appreciate the effort to fit each man best to his most successful kind of job.

We start developing flexibility at the lowest level of management by selecting foremen from the ranks of utility operators, who have had training and experience on literally every kind of factory job. We welcome opportunities to transfer assistant foreman and department heads from line to staff and vice versa, from engineering to production control, from production control to sales administration, etc. We have tried letting two men in different jobs each spend half-time learning the other job. This has not been successful, but we believe that there are occasions when two supervisors can trade jobs completely, calling on each other for assistance only as it is needed. This rotation or lateral transfer of management personnel at the lower-level management jobs has an additional desirable effect. It not only broadens and develops the individual involved but materially aids smooth operation and effective cooperation between the departments or divisions of the business concerned. Periodically bringing into each department a fresh personal knowledge and understanding of the other department's viewpoint has a revitalizing influence on cooperation and tends to check the "fence-mending" and "empire-building" which has an unfortunate tendency to develop in a highly established situation.

**"Committees can operate effectively and speedily, with members learning important leadership functions."**

Another device which we have found successful for both improving present performance and preparing for future advancement is the committee. We use committees extensively for product screening and recommendation, to analyze and improve order flow through our office and technical departments, to study and improve office and plant layouts, to make suggestions award payments, for wage and salary administration, to carry forward applied research projects, and for a variety of special problem situations.

A common complaint heard in many organizations about committees is that they are time-consuming. It has been said that a committee is a number of people meeting to agree jointly that they cannot do anything collectively which cannot be done individually, and that a committee is a body which keeps minutes and wastes hours. There is undoubtedly much sound reason for these derogatory comments about committees, and to try and eliminate these reasons we have devoted much time and effort to study and practice in the effective operation of the small group in the work situation. Many of these committees do not have a formal leader or chairman and yet they operate very effectively and speedily, because members have learned the leadership functions of objectives, methods, participation, and summary, and individually exercise these functions.

Let's look briefly at one of these committees, as an example. We are a job-shop in hardened steel machinery parts. One of the regular problem areas is deciding what we *can* make, *how* to make, and how *good* we can make it and at what price, *what* the market potential is, and finally, whether to quote (or accept an order) or not. All

A SUMMARY CHECKLIST

## TO DEVELOP ITS MANAGERS, THE WESTERN SMALL PLANT SHOULD . . .

1. **Have a sound organization structure, and have it clearly understood.**
2. **Use every available outside trade, professional, and academic organization to furnish learning opportunities.**
3. **Use job rotation in the lower-level management jobs as early as possible in each man's management career, and as extensively as possible, but only in regular and essential positions where results can be measured, and not in observer positions created for training only.**
4. **Utilize memberships in standing and special assignment committees to boaden the individual's viewpoint, provide tests of leadership, imagination, and cooperative effectiveness.**
5. **Have a policy of and maintain effective practice of free and comprehensive communications on all matters of organizational interest, not just those directly affecting the individual or individuals involved in these communications.**
6. **Continuously develop more effective democratic leadership in management to provide a maximum of desirable motivation and fully utilize this opportunity for management development by placing full emphasis on the day-by-day, superior-subordinate counseling which is a natural part of it.**
7. **Make one of the most important test questions of management performance "How rapidly and effectively is he developing his own replacement?"**

doubtful cases are screened from inquiries and orders by the order department head and submitted twice weekly to the Product Advisory Committee of which he is a member. Other members are the assistants of the chief mechanical engineer, chief metallurgical engineer, chief industrial engineer, factory superintendent, and chief inspector. They pool their knowledge and experience, weight the arguments, and reach a decision. Rigid restrictions exist to limit any reversal of their decisions, although this may occasionally occur for top level reasons of customer-relations policy.

It can readily be seen that this group not only performs a vital function effectively, but serves as a continuous training program for its members. The committees, then, serve to broaden the understanding of the individual of problems of other parts of the business. They sharpen the judgment of the individual through practice on many management matters which are frequently not a matter of direct responsibility to him in his normal job. Real training in management can take place best only when the individual has some true responsibility for the exercise of his judgment and when the results will measure the value of his efforts. The committee also serves as a means of developing communication skills, listening, understanding, explaining, and persuasion.

**"Human relations is probably the most important skill of management, and the most difficult."**

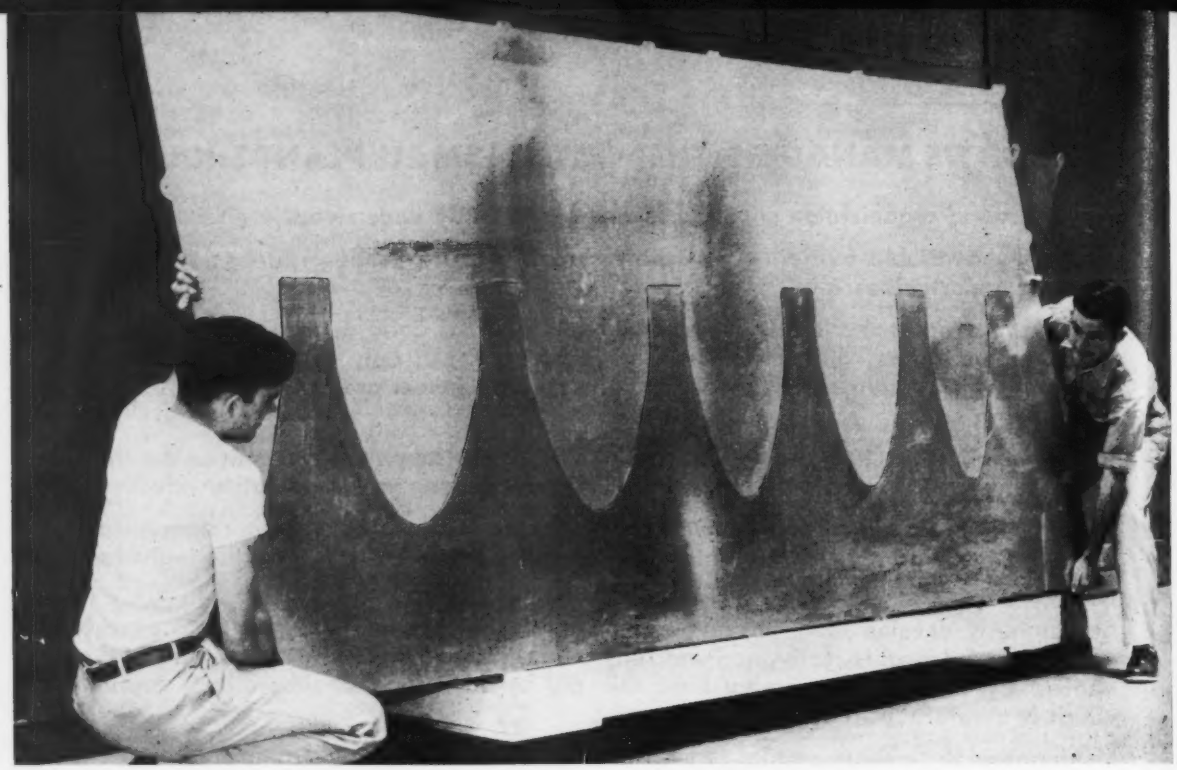
Any mention of communications skills certainly leads to a discussion of the human relations skills of management, and this in turn directly to the motivation factor in developing effective managers.

Human relations and communications are probably so closely related as to almost be synonymous. Human relations is probably the most important skill of management, and it is also almost certainly the most difficult. Human relations in the management field might perhaps be defined as the art and science of achieving desirable motivation and individual satisfaction. The philosophy and techniques of communication are certainly an essential part of this process.

We hear a great deal about morale and its effect on performance. We all know that morale has a major effect on motivation and that motivation is of paramount importance to performance. Maybe we should try for a working definition of morale. It may be many things but we believe that basically it is confidence. Confidence on the part of the individual that he has the maximum possible amount of freedom and self-sufficiency; confidence in his leadership, confidence in the ability of this leadership; but even more importantly, a confidence that under all circumstances he, the individual, will get the best possible break from his leadership and his organization, consistent with the circumstances.

Because we believe this, we believe that a philosophy of full and free two-way communications is essential, and that methods and channels of communication must be effectively established and utilized. We all mistrust what we do not understand, and we fear the unknown. How then can we feel free to exercise our own personal good judgment and how can we feel self-sufficient unless we are fully informed about what's going on around us in an organization and what is apt to happen in the future insofar as this future can be predicted from what we know today? As a philosophy of commendation, then, we believe that with the exception of personal pay rates and information which might adversely affect our competitive position, all matters of organizational knowledge are fit subjects for communication throughout the organization.

. . . concluded on page 64



**BONDING OF STIFFENERS** to aircraft wing skins to save weight and enable structural strength to be built in where stresses are greatest is an example of how the West's aircraft industry has pioneered the . . .

# Uses of structural adhesives

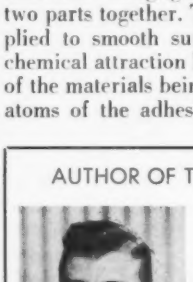
***There are plenty right now for this fabulous bonding technique, and more are being developed. It's time you looked into the possibilities.***

IF you're not already using structural adhesives in your plant, the chances are that you will be soon. These new chemical adhesives, which a decade ago were a laboratory curiosity, are being produced in the United States today at the rate of a million pounds a year—and they're still not meeting demand.

The West has pioneered this tremendous growth in structural adhesives. The aircraft industry is using these adhesives to meet its needs for lighter and stronger structural materials. Other industries are finding a myriad of uses for the bonding materials in solving their fastening problems. Automobile manufacturers, construction firms, chemical processors, furniture manufacturers—they're all experimenting with structural adhesives.

The basic difference between conventional glues and cements and the new structural adhesives is that the glues work mechanically and the structural adhesives work chemically. Glues are usually applied to a rough surface; they penetrate the pores of the materials being glued and grip the two parts together. The adhesives, applied to smooth surfaces, produce a chemical attraction between the atoms of the materials being bonded and the atoms of the adhesive. This actually gives you one piece of material, instead of two pieces held together.


AUTHOR OF THIS ARTICLE



**WILLIAM D. RAINEY**
**Technical Sales Manager**
**Narmco Resin & Coatings Co.**
**Costa Mesa, Calif.**


The aircraft industry has led the way in the field of structural adhesives because of the demands made by jet aircraft for adhesives capable of bonding air frame structures, withstanding extreme temperatures and providing greater fatigue life.

Welding or riveting thin skin air frame components requires a lot of time and expensive tooling and often results in low fatigue life in the welded or riveted areas. Structural adhesives are better for bonding thin skinned materials because they provide a positive attachment that is continuous over the entire bonded surface, distributing loads and minimizing stress points.

Structural adhesives are also good fasteners for securing doublers and stiffeners to large areas of metal where you need localized thickness, strength or rigidity. Adhesives permit equal flexing action, which gives longer

fatigue life, and a lighter structure because there are no rivets or welds. They eliminate stress concentrations and will withstand sudden temperature changes.

Aircraft manufacturers are also enthusiastic about structural adhesives for bonding magnesium and aluminum, a rather delicate operation because magnesium is highly susceptible to corrosion when in contact with other metals. In addition to attaching the two, structural adhesives set up an insulating barrier between the metals that are being bonded.

### Essential in sandwich construction

Many planes are composed of a large amount of sandwich construction consisting of a very lightweight core material, such as honeycomb, Multiwave, balsa wood or synthetic foams, and structural adhesives are used to attach thin facing skins to these cores to form the complete sandwich structure. Here's a case where bonding with structural adhesives has eliminated a lot of difficult production problems involved in spot welding or riveting these attachments.

The F-102, the Air Force's first supersonic, all-weather jet interceptor designed and built by the Convair Division of General Dynamics Corp., is a good example of a plane using structural adhesives in sandwich construction. Narmco, Inc., a firm organized a decade ago to develop and produce structural adhesives, supplies such components as nose wheel doors, rudders and wing tips, all of sandwich construction, for the F-102.

### Airplanes are testing ground

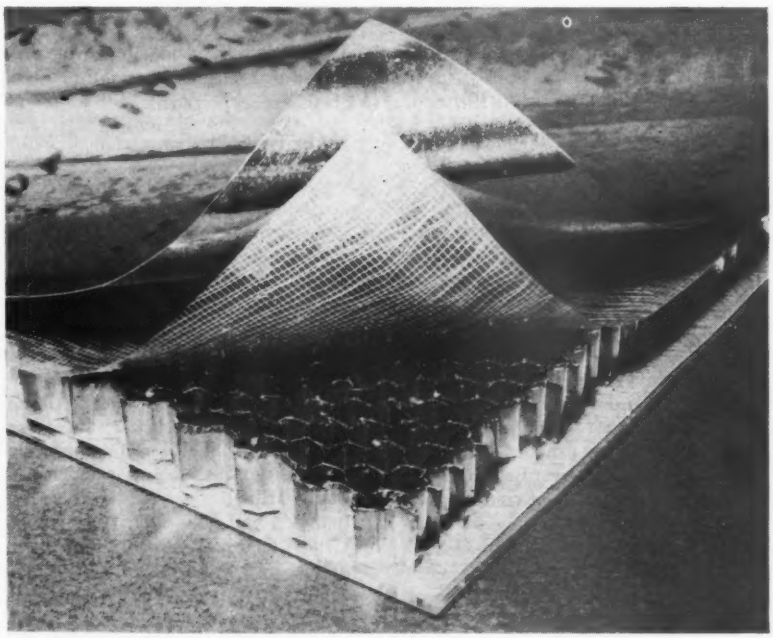
The first big test for structural adhesives in the aircraft industry came with the development of the B-36. Convair and Narmco cooperated on design and production of the bomber, which was the first production airplane to use structural adhesives to join metal parts over large areas. Practically every plane built today has components bonded with structural adhesives.

As structural adhesives are used more and more, demand for different types increases. High speed missiles require adhesives capable of withstanding extremely high temperatures for short periods of time. Arctic regions and high altitudes call for adhesives that retain their properties in sub-zero temperatures. Some adhesives must meet low creep rate specifications, while others must have a high impact quality and be rubber-like in nature.

Constant research has produced a number of improvements in the physical make-up, appearance, strength, and heat resistance of structural adhesives. The latest types will retain their bonding properties at temperatures of 500 deg. F., compared to 150-200 deg. F. a few years ago; adhesive properties have increased about 40% during the past three or four years.

While the aircraft industry leads the way, other industries are evaluating structural adhesives. Adhesives for industrial uses usually do not have

**HIGH RIGIDITY** in relation to weight is achieved by the use of sandwich-type construction for these radio van trailers shown being loaded aboard a Douglas C-124 Globemaster. Core material used is Douglas Aircomb, a paper honeycomb impregnated with phenolic resin. Such core material can be bonded to face materials like aluminum, plywood, stainless steel, etc.



**SANDWICH CONSTRUCTION** elements are shown here—lightweight honeycomb core, scrim cloth or carrier (glass fabric impregnated with high temperature adhesive), and thin skin material. Bonding with structural adhesives has eliminated a lot of production problems in the attachments.

**ONE OF THE FIRST USES** of adhesives in industry was in bonding brake linings to shoes. Here, linings and shoes are being clamped together ready to be placed in the curing furnace at a Chrysler Corp. plant.

to withstand the extreme heat, expansion, and vibration that they do in the aircraft industry; it's more important in general industry that they dry quickly.

### More and more applications

Automobile manufacturers are looking to structural adhesives for savings in weight and cost which means more efficient operation, greater durability, and increased safety. Brake lining bonding, which replaced riveting, was one of the first applications of structural adhesives in the automobile field. Current research is looking into the use of adhesives as a fastening and sealing agent around windshields, for securing weather stripping around doors and windows and in adhering soundproofing and other types of insulation material to various auto parts. Elasticity is one of the properties of the adhesives that makes them suitable for securing glass to glass, metal to metal, or metal to glass. Light, strong, resin-impregnated laminating materials can also play a major role in fabricating fenders, car bodies, and steering wheels.

Manufacturers of transport vehicles are interested in sandwich structures, particularly for trucks and trailers. Some believe that the increased pay loads made possible with these lightweight structures will offset the higher cost.

Sandwich structure also lends itself to many applications in the architectural field and its future use in building is almost limitless. Already a number of new structures have been built using panel sections prefabricated of laminated materials bonded with structural adhesives, among them the San Francisco International Airport terminal building and the air mail and cargo building. Some 60,000 sq. ft. of laminated wall panels were used in these two buildings to make attractive walls and keep weight down. Again elasticity was an important factor; the airport is built on marshland and buildings are subject to possible differential settlement because they are essentially floating. Laminated panels won't show cracks like more rigid walls might. Speedier construction, reduced weight, uniform strength, and lower costs are other advantages of bonded laminates for building.

Also growing is the production of adhesive-bonded tubular Fiberglas products that are both tough and flexible. Sports equipment manufacturers are using them for hollow Fiberglas fishing rods and blanks, but they also have potential uses in other fields because of their weather and corrosion resistance. They should be good for baseball bats, golf clubs, hockey sticks, canes, etc.

Furniture manufacturers are experimenting with adhesives in laminates for the production of office furniture and equipment, such as chairs, tables, cabinets, desks, and drawers.

As greater advances are made in producing low cost sandwich core material, structural adhesives will be used in sandwich-type products like signboards, cargo containers, refrigerators, storage buildings, hangars, portable shelters, scaffolding planks, and outdoor movie screens.

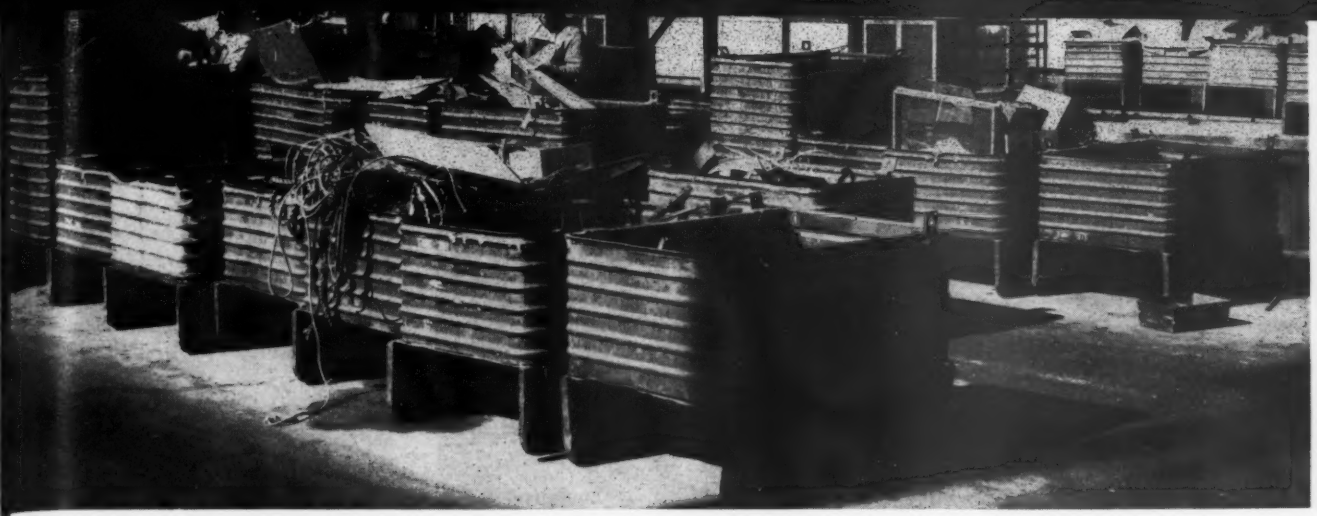
Another product associated with structural adhesives is filled resins or putties. These are resins that can be applied easily and which harden quickly at room temperatures and adhere to various kinds of surfaces. They are used to smooth over open ends of sandwich structures to provide a round, symmetrical edge on otherwise rough material, and they can be used as fillers or sealing for small openings or joints.

Chemical processing is one of the largest potential fields for these adhesives. They can be used to plate interiors of storage tanks, steam pipes, and nearly all types of underground piping.

### Patching and repair work

Another industrial use of structural adhesives—for patching and repair work—is largely unexplored, but it could become one of the most important to industry. What research has been carried out indicates that these adhesives can be used for repairing boilers, tanks, and other large components of metal, wood, or glass, offering durability, versatility, and easy application at moderate cost.

Although the use of structural adhesives is booming, it will be speeded still more as private and commercial industries do more experimenting with possible applications. Compared to the potential of these adhesives, applications are still comparatively few. This is due in part to the high cost of the material and the difficulty in obtaining skilled technicians to discover and develop more uses. But as the adhesives become more readily available at less cost and as research continues to prove their superiority over glues and rivets, their uses in industry will multiply rapidly.



**MAGNET, SHAKER, OR HAND EXTRACTED** from combined loads of scrap, metal from wide-spread points in Convair's plant is sorted into tubs by type and size. Much of it is sold back to aluminum and other metals producers.

# Million $$ from sale of scrap

***Here's how Convair sorts and sells "waste" materials left over from its manufacturing set-up in San Diego, Calif.***

OPERATORS of Convair division of General Dynamics Corp. in San Diego believe in getting every possible penny back on materials investment and here's a figure to prove it. Sale of scrap materials added $1,070,145 to the annual income of this plant during the 12-mo. period ending in February. Salvaging and selling the "waste" materials involves a small investment when compared to these outstanding returns.

More than half of the amount—$510,560—resulted from sale of aluminum scrap. The metal is sorted and sold back to aluminum producers. Returns from other items, such as shipping crates, Fiberglas cloth, and miscellaneous materials amounted to $396,227. Trash, rivets, and metals other than aluminum accounted for $163,358.

Here's how it's done:

All trash and floor sweepings are raked over a grid in the salvage yard. Metal items pass over a magnetic wheel which extracts all steel parts. Aluminum rivets and other small non-magnetic items are shaken from a vibrator and larger metallic parts, wood, and cardboard are sorted into separate piles.

To realize the highest return from sale of scrap, all metals are classified into various types, including titanium, magnesium, copper, and stainless steel.

Convair has agreements with outside firms who employ handicapped persons to sort small hardware items including rivets, bolts, nuts, and fasteners. Plant employees have top priority in purchasing salvage.

**RIVETS, SCREWS, AND BOLTS** are sifted from floor sweepings by a vibrating separator. Heavier than paper, etc., they fall through a screen to lower chute.

**COMPRESSED CARDBOARD** is wired after baler reduces it to a 650-lb. bale measuring 60x40x30 in. Earlier sorting is done to remove non-saleable materials.

**"CALIFORNIA'S CLIMATE** . . . and a chance to work in 'creative engineering' helps swing a lot of engineers our way," says Andy Aitken, Northrop manager of engineering industrial relations.

**"ENGINEERS?** If they're warm, we want them—good, bad, or indifferent," admits Northrop's manager of industrial relations, John B. Clark. "Production's not being held up, but. . . . "

**"AT ONE BIG ENGINEERING SCHOOL** there were more of us recruiters on hand than there were graduates to recruit," reports recruiter J. Robert Willson, employment manager at Northrop.

# The West's battle for engineers

***Here's how Western aircraft-missile plants, with bulging production backlogs, are beating the bushes coast-to-coast for job-loose engineers.***

"GIRLS," goes the lyric, "if you want a hubby with an *assured career* . . . latch onto an aeronautical *engineer!*"

But if winsome maidens are aprowl for the elusive slipstick boys, so are "recruiters" from just about every major U. S. company, including Western aircraft firms.

Indicative of the growing scramble for engineering talent:

- One Los Angeles planemaker offers employees $100 for snagging an engineer, signing him up, and keeping him on the job at least 90 days. And the "bonus" goes higher if the engineer turns out to be top-flight.
- A missile outfit in Southern California recently hired a recruiter solely because he was on social good terms with a big university's job-placement director. For often a school's placement director can swing a soon-to-be-graduated engineer toward a favored company.
- Another aircraft company has just signed a contract for an expensive documentary movie . . . not to soothe stockholders, but to win prospective engineers to "California living and working conditions."
- A team of aircraft recruiters from the West was recently told to leave a city dominated by an eastern competitor. If they didn't, the eastern plant threatened to invoke a little-used local ordinance, fining "invading employment recruiters" $5,000 for "raiding."
- In Toronto, Avro Aircraft, Ltd., complained that Western planemakers were winning away top-flight engineers with "salaries more than 100% higher than we can afford to offer."
- A Western Chamber of Commerce director quipped recently that aircraft recruiters were California's greatest boosters, and at no cost to the Chamber.

For all the antics of the recruiters, the engineering shortage is deadly serious, and none realizes it better than Western aircraft missile men. A decade ago, the big demand was for aeronautical engineers. Today, any engineer with a sheepskin, good, bad, or indifferent, is hired. Beginning salaries for men right out of college are pegged at $400-$450 a month, with $1,500 for senior engineers not uncommon. The man with an M. S. or Ph. D. can name his own salary, and often does.

The shortage is two-fold: engineers, of course, are hardest to come by. But so are skilled machinists. Still, the machinist-scarcity is termed "chronic" by most Western employers, while the dearth of engineering talent is called "critical."

What effect has this twin-shortage upon production? North American, for one, says, "We've never had enough engineers nor enough machinists. But that depends on what you mean by *enough*. The lack has never held up production. We've simply worked some men harder, put them on an extended work week, 45 instead of 40 hours."

Another aircraft spokesman shudders at the prospect "that the missile program may be put on a 'crash' basis.

If that happens, the scramble for engineering and machining talent will get completely out of hand. Frankly, I don't know what the smaller companies will do."

Actually, the smaller companies will likely do all right. And here's why: smaller firms have consistently paid higher salaries, and often their work is just as challenging as the prime contractor's. Some engineers and machinists naturally trend toward big firms and their packaged security plans. But many others—especially younger men—shun security packages in favor of working in more closely-knit teams, in smaller, less regimented plants.

Still, as in the past, it's the smaller firm which is most strenuously "recruited" for possible engineering talent.

### Newspaper ads tell the story

One big aircrafter, unwilling to tip its recruiting plans, says simply, "If you want to know how bad off we are for engineers and machinists, read the papers."

Ads are, admittedly, all-revealing. Some typical recent examples:

- Bell Aircraft's Buffalo works took space in the Pacific Coast edition of the *Wall Street Journal* bidding for development, design, project, and flight-test engineers. The pitch: "Top Professional Assignments."
- North American's Downey, Calif., plant, calling for milling machine operators, engine lathe men, precision grinders, and tool and die makers, used this tack: "We can offer you close tolerance work, first-class machines, excellent working conditions. Company benefits include group insurance, paid vacations, and paid retirement."
- Most pointed of all, perhaps, was an aircraft parts plant in Los Angeles which beckoned turret and engine lathe operators with assurance of "a 58-hour week."
- Ryan Aeronautical Co. recently beckoned Los Angeles engineers to "smog-free San Diego, where you will receive top pay and enjoy living in healthful and uncongested San Diego." Ryan recruiter Ralph Haver advised he was staying at Hollywood's Highlander Motel, was eager for calls "any hour . . . any day."
- Blazoned along every major highway inbound from the California border—and in scores of local papers—are Convair's invitations to the newcomer to "Come to Convair."

Behind such huckstering is stern and sober fact. The missile program, far overshadowing aircraft production, has nurtured a new crop of engineering giants: Aerojet-General, Hughes, Ramo-Wooldridge, and Rand, Inc., to name a few. Hundreds of satellite engineering firms have mushroomed in and around major aircraft plants. All depend upon a hard core of top rate engineers.

### Tricks of recruiting trade

How are the majors wooing and winning recruits? One firm solicits prospective engineers even before they've graduated high school, foots cost of their books and brings them in the summer to the plant to "get the feel of our operation." Another sets up scholarships at leading universities, with no strings attached, though naturally the corporation hopes that scholarship holders will drift into its engineering orbit. Still another flies college juniors from the East, spots them in a summer job, sees that they have a full social program. Meanwhile, young prospects are imbued with California living—the climate, opportunities for work and pleasure.

And always, recruiters keep a weather eye open for news of some firm "phasing out" on a contract. Just before a contract's expiration, recruiters descend on the area, set up "selling rooms" in the best hotel in town, get word out that a hiring team is auditioning.

Northrop, for example, keeps chief recruiter Andy Aitken and his staff of nine hopping coast to coast. This year Northrop, for the first time, will set up shop at Manhattan's Career Day show (last year visited by 50,000 young job-searchers). Aitken and his staff visits dozens of colleges annually, talking up the advantages and high wages of California. Statistics help, for a recent labor survey showed Los Angeles aircraft workers earning 11% more than their eastern counterparts. "The climate . . . and Northrop's good name nationally, help too," admits recruiter Aitken.

### Citizenship no barrier

Nor do aircraft firms stop with U. S. citizens. If an engineer—a Canadian, for instance—shows he's applied for first papers, that he wants to become a U. S. citizen and work for an aircraft firm, likely he'll be flown to Southern California and given non-classified work until his citizenship and security are cleared. Some airframe and missile firms have set up special departments to push citizenship and security rulings on likely

## Why the mad scramble for engineers in the West?

For all the antics of the recruiters, detailed in this special WESTERN INDUSTRY news report, the engineering shortage is deadly serious . . . and no firms are in a position to realize it better than Western aircraft-missile men. These firms, with bulging production backlogs getting ever bigger (well into the billions now in dollar value), could at this moment use *three times* the number of engineers they're able to get.

How it's all happened is simple. Though Russia, for example, is currently turning out some 50,000 graduate engineers annually, the U. S. in 1955 graduated but 24,000 against an estimated need for 50,000 to 70,000. And, though young men and women are entering engineering at record rates, not until 1960 will we be graduating 30,000 engineers, against a projected annual need then of 100,000 each year.

On top of it all, Western industries of all types have been expanding at breathtaking rates and necessarily siphoning off much of the engineering talent available in the West. There has been a constant flow of engineers east to west during the past decade, but the flow has been a rivulet compared to the stream that's needed.

Engineer recruiters are mighty key men in major Western plants today, and they will continue to be key men in the West's expansion plans for quite a few years to come. . . . Ed.

looking new engineering citizens.

A classic recruitment occurred recently when United Control Corp. engineer-hunters, lunching at Seattle's Washington Athletic Club, discovered that a busboy was a one-time Warsaw engineer. He'd been captured by the Nazis, put to work in a research hideaway in the Swiss Alps. At war's end he'd turned to radio repair in Austria. had finally migrated to the U. S. and become a busboy. Today, he's "one of our most valuable engineers," says a United Control spokesman.

Aircrafters are dredging up engineering talent hidden in their own plants—an assembler, perhaps, who'd begun an engineering career, but gave it up when he married. Files are being sifted, personnel dossiers checked. Former pre-engineering majors are being urged to give up the monkey-wrench, and take sliderule in hand once again. The company as often as not finances the employee's refresher course at a local college or packs him off to the university to earn his sheepskin (sometimes prepaying upwards of 80% of his schooling).

### Engineers are sportsmen, so . . .

For the first time, you'll notice "engineers wanted" ads splashed across sports pages of the nation's dailies. Why? Because sharp-eyed recruiters have found that engineers are often avid sportsmen, and they're more likely to scan an ad if it's located near the team standings. Or consider Northrop, which for more than a year has lulled potentials with light classical music over Los Angeles' KFAC. "Engineers," explains an energetic Northrop recruiter, "like music—the classical kind. We're frankly appealing to their tastes."

Close-mouthed recruiters will seldom admit what they offer prospects. Says one, "We shun any open bidding, like 'We'll give you 40% more than John Doe Co.'s offer'." Says another, "we meet the industry wage . . . start dickering upwards from there." "About $425 a month is rock-bottom with us," says another, "and if a man's got an M. S., we start talking turkey at about $600. If he's got his Ph.D. . . . well, it's up . . . up . . . UP!"

The recruiting pace is terrific and growing more hectic. And, though most aircraft firms have a kind of gentleman's agreement not to invade each other's territory, the boundaries are about as loosely defined as were Nazi Germany's in 1939. Example: during one week in February, McDonnell Aircraft's recruiters (flying in from St. Louis) had set up headquarters in a hotel nearby the Los Angeles International Airport, within whistling distance of North American, Douglas, and others (McDonnell has 12 recruiters today, compared to a mere two in 1951). In town, too, were Convair reps. Admitted one aircrafter, "The A.I.A. non-poaching pact has gone out the window. Look, we've got a terrific backlog. We desperately need engineers. And we're out to get them wherever they're to be found."

One good reason for going direct to aircraft areas is the mounting competition on the college level. Explains one recruiter, "I was back at M.I.T. this past month, looking over mid-year graduates. But so were reps from no less than 400 major firms from all over the U. S. Now, the average M.I.T.'er has time, what with finals and studying, to see but 10 reps. You make your pitch—and make it good—or you're out in the cold. With 400 companies bidding for the services of M.I.T. graduates, a lot are going to come away empty-handed. Best bet is to work the smaller plants. They're more productive than the colleges."

Most poignant reminder of the engineering scramble came during Los Angeles' recent downpour, when 75% of the area's aircraft plants closed down for two days. Yet those which remained open ran big ads, advising rain-vacationed engineers to "come to work today in our engineering department."

Concedes one of the advertising companies. "We didn't snag many engineers with that one—but it was a good try, anyway."

### The costs are enormous

No one admits what it's costing to recruit talent. But the outlay is enormous, especially when you count bonuses for turning up a prospect, cost of recruitment, special incentives like scholarships, cost of moving a family West.

One company, for example, brings the whole family West by first class air accomodations, and pays air-freight for upwards of 6,000 lb. of household furnishings. One catch is that the engineer must figure travel pay as wages and report it on his income tax. To offset this tax bite, one California airframe maker even chips in with the taxes!

The situation is serious and growing worse. The plain fact is that Western aircraft-missile plants could use three times the number of engineers they're able to get.


FOR COPPER AND BRASS MILL PRODUCTS SEE THESE

REVERE DISTRIBUTORS

ON THE PACIFIC COAST

**AMERICAN STEEL WAREHOUSE CO.**
425 N. E. Ninth Avenue, Portland 14, Oregon
Phone: BEImont 2-9111

**AMERICAN STEEL & SUPPLY CO.**
44 & 51 E. 7th St., Eugene, Oregon
Phone 5-0373

**EAGLE METALS COMPANY**
4755 First Ave. South, Seattle 4, Wash.
Phone: LAnder 9974
Helena at Broadway, Spokane 24, Wash.
Phone: KEystone 0586
2336 No. Randolph, Portland 12, Ore.
Phone: ATlantic 8-5201

**PACIFIC METALS CO., LTD.**
2187 So. Garfield Ave.,
Los Angeles 22, Calif.
Phone: RAymond 3-5431
3100—19th Street,
San Francisco 10, Calif.
Phone: Mission 7-1104
261 W. 5th South St.,
Salt Lake City 4, Utah
Phone: Davis 2-3461
909 No. 1st St., Phoenix, Arizona
Phone: ALpine 4-0369
1533 India Street, San Diego, Calif.
Phone: FRanklin 9-5826

**TAY-HOLBROOK, INC.**
603 Brown St., Box 3038
Bakersfield, Calif.
Phone: Fairview 5-1221
940 Broadway, Eureka, Calif.
Phone: HI 2-4516
920 "M" Street, Box 1866
Fresno 18, Calif.
Phone: 6-8231
222 Ninth Street, Oakland 7, Calif.
Phone: TE 2-4200
1801—22nd St., Sacramento 4, Calif.
Phone: HI 6-3841
P. O. Box 969, Salinas, Calif.
Phone: 2-4771
605 Old County Rd., San Carlos, Calif.
Phone LY 3-7631
165—8th Street, San Francisco 1, Calif.
Phone: MA 1-6800
695 Stockton Avenue, San Jose, Calif.
Phone: CY 2-3606
251 Roberts Avenue, Santa Rosa, Calif.
Phone: S.R. 6400
1234 So. Aurora St., Stockton 8, Calif.
Phone Howard 6-9531

**UNION HARDWARE & METAL CO.**
5555 E. Ferguson Avenue
P. O. Box 3070, Terminal Annex
Los Angeles 54, Calif.
Phone: RAymond 3-2411

REVERE

**COPPER AND BRASS INCORPORATED**
*Founded by Paul Revere in 1801*
230 Park Avenue, New York 17, N. Y.

*Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton, and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y.*
*Sales Offices in Principal Cities.*
*Distributors Everywhere.*

LOS ANGELES: 6500 East Slauson Ave. Raymond 3-3331; SAN FRANCISCO: 116 New Montgomery St. Sutter 1-0282; SEATTLE: 314 Fairview-North. Main 1401

# REVERE

## Extruded Shapes give HUBER 5 GREAT ADVANTAGES

### —they can do as much for you

This is the story of a Brazing Torch valve body, made by Huber Industries, Cincinnati 38, Ohio, chiefly out of a brass extruded shape furnished by Revere. As a result of experience Huber has become an outspoken advocate of shapes. Here are the five advantages Huber has found:

1. Machining time reduced 50%.
2. Uniform dimensions mean only one machine set-up for each operation.
3. No rejects whatever. Testing completely eliminated.
4. Uniformity of metal means minimum wear on tools.
5. Buy slugs cut to length, eliminating cutting-off.

The only part of this valve not of brass is the stainless steel conical valve stem.

An extruded shape costs more per pound than standard rod or bar, but the reductions in machining, finishing and other costs much more than make up the difference, and you save money. If you are machining copper and copper-base alloys, or aluminum alloys, get in touch with Revere and learn the advantages of extruded shapes.

Progressive steps in producing valve, beginning with the shape as supplied, cut to length.

Huber Type 100, Model A Brazing Torch.

**REVERE**

**COPPER AND BRASS INCORPORATED**

*Founded by Paul Revere in 1801*

230 Park Avenue, New York 17, N. Y.

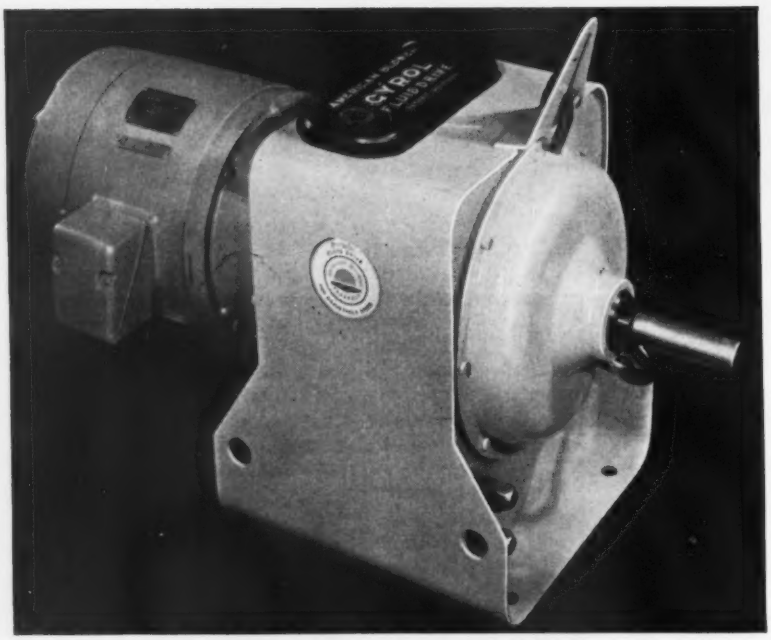
• • •

*Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.*

**"The Revere Four-Way Service" is a 16mm sound motion picture in color, educational and informative. If you haven't seen it, write nearest Revere Office.**

*. . . for more details, circle No. 27 on Reader Service Postcard*

# Just out—new, smaller sizes in Class 2 Gýrol Fluid Drives!




Type VS, Class 2 Gýrol Fluid Drive for 1- to 800-hp applications.

With the addition of new sizes in the lower horsepower range, you now have a *complete line* of Type VS, Class 2 Gýrol Fluid Drives from which to select – 1 hp to 800 hp, speeds to 3600 rpm!

These compact, self-contained units offer unlimited application possibilities, because of their important benefits: adjustable, stepless speed control; reversible while in motion; 5 to 1 speed range; no-load starting; complete shock absorption; remote, manual, or automatic control; quiet operation.

For full information on the complete Type VS, Class 2 Gýrol Fluid Drive line, contact our nearest branch office. There is one in every principal city.

**Typical Applications:**

PUMPS, AGITATORS, MIXERS

CONVEYORS, CABLE & ROPE MACHINERY

FANS AND BLOWERS

CENTRIFUGAL COMPRESSORS

PAPER AND PRINTING MACHINERY

TEXTILE MACHINERY

## Simple design, flexible operation

Runner Vortex of Oil Impeller

Gýrol Fluid Drive provides a simplicity of design and a flexibility of operation no other method of power transmission offers – plus an inherent safety factor. Operates on hydro-kinetic principle, using vortex of oil to transmit power from driving to driven machinery. Power is transmitted smoothly, evenly, efficiently, without shock.

**American Blower products serve industry**

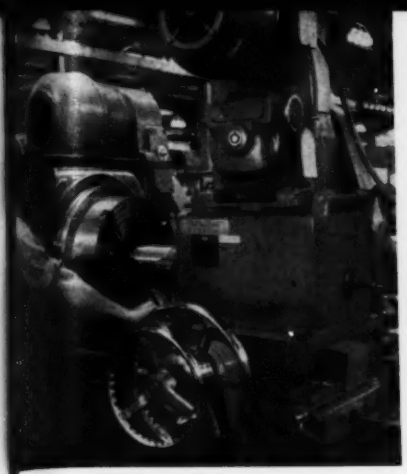
- Air Conditioning, Heating, Ventilating Equipment
- Mechanical Draft Equipment
- Industrial Fans and Blowers
- Centrifugal Compressors
- Gýrol Fluid Drives
- Dust Collectors
- Refrigerating Machines

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American-Standard

**AMERICAN** 75th ANNIVERSARY YEAR 1881-1956 **BLOWER**

*... for more details, circle No. 28 on Reader Service Postcard*



**DURING PRODUCTION** 212 machine tools were used in this ordnance plant to make 76-mm. rifle barrels.

**SAFE FROM CORROSION AND WEAR,** each of the 212 machine tools with drive equipment and controls is in location and ready to roll at a moment's notice. Overhead heaters maintain less-than-50% humidity.

# On-the-spot equipment storage

***Ever have to store plant equipment for an undetermined length of time? Here's how a whole plant was "stored," but left ready to roll.***

STORAGE of machinery, sometimes necessary in food processing, aircraft, and other industrial plants, is a matter that has received much of the government's research consideration in connection with current layaway plans. Ordnance plants are being put into varying degrees of storage on a 5- or 10-yr. basis.

Experience with storage all over the country has borne out that fact that no standard method of storage can be defined for the entire country. Local weather conditions vary too widely.

### Storing 212 machine tools

A good example of one method of in-plant storage under Western conditions is the ordnance plant at Be-Ge Manufacturing Co., Gilroy, Calif., producer of farm equipment. Here a building 400 x 180 ft., separate from other Be-Ge manufacturing facilities, houses equipment used to manufacture 76-mm. rifle barrels, involving about 212 tools: boring lathes, vertical turret lathes, slotters, broaching machines, rifling machines, and grinders.

Supervised by the San Francisco Ordnance District, first step in the job was to determine climatic characteristics of the Gilroy area and determine the most economical means by which an effective storage job could be done.

Survey of the climatic conditions revealed that humidity ranges—15 to over 100%—in the area are such as to permit the economical use of heaters to keep ambient temperatures up and, in turn, keep relative humidity below 50%. Desired temperatures in the building were established at 10 deg. above outside temperatures, which range from 25 to 100 deg., with a minimum low temperature of 35 deg. These points determined, storage operations were started.

Key to the effectiveness of any storage job is the quality of cleaning machinery. All moving parts and exterior surfaces on the machines at Be-Ge were cleaned with solvent. Next step was to repair each machine so it would be suitable for one year of operation.

Then all lubricants in each machine were replaced with rust prohibitive additives. Oil used was Shell Ensis oil, and grease was replaced with Shell 2-112 lubricant. Each machine was run with oils passing through filters to collect foreign matter, and all pans and bases were vacuumed to remove residues.

All machines were then coated with cosmoline-type substance, a Valvoline product, thinned with solvent. After application, solvent evaporates and leaves the protective coating on machine surfaces. Formerly, layaway procedure called for the use of a heavy cosmoline which, in time, hardened and presented an extremely difficult substance to remove, also, during removal the material runs into gear boxes etc., causing extensive damage.

Actual application of the lighter coating is difficult due to the nature of the substance and the usual problems encountered during application of any coating to a vertical surface. Workmen operating spray guns were well-trained to overcome these problems. Also, additives in the compound tend to separate in containers prior to application. This problem was remedied by insertion of an air hose in barrels during application. Air passing into the mixture agitated it and eliminated additives separation.

### Shrouded just in case

Next, vapor inhibitor coated shrouds were placed over each piece of equipment to prevent corrosion in case of a break in the coating and to protect the coated surfaces from alkali dust and other corrosive particles in the air. However, moisture collects automatically under these shrouds and, if sealed to the floor, has no means of escape. So a space was left between shroud and floor and

**Calks prevent slipping off logs, but . . .**

# 40 steel diamonds grip every step on low cost

## A.W. SUPER-DIAMOND

*ECONOMY ROLLED STEEL FLOOR PLATE*

Wherever slipping hazards exist, install A.W. Super-Diamond for maximum foot safety at economy price. Keys to Super-Diamond's anti-slip protection are the raised diamond figures alternately spaced at right angles and correct distances for maximum friction from any angle of approach.

A tough rolled steel floor plate, Super-Diamond can be fabricated with ordinary shop equipment. Use it structurally, as an overlay or as complete flooring.

*No other floor plate can match Super-Diamond's safety, durability and easy maintenance at so low a cost.*

**A.W. SUPER-DIAMOND**
**ROLLED STEEL FLOOR PLATE**

*"The diamond in the rough . . . a gem of a flooring."*

**ALAN WOOD STEEL COMPANY**
**Conshohocken, Pa.**
**Please send A.W. Super-Diamond Booklet SD-13**

Name_____
Title_____
Company_____
Address_____
City_____ Zone_____ State_____

Other products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Sheets —Strip—(Alloy and Special Grades)

For plants where oil, water and grease raise special problems of slipping accidents, we suggest a check on the special qualities of A.W. ALGRIP . . . the world's only abrasive rolled steel flooring.

*. . . for more details, circle No. 29 on Reader Service Postcard*


the air passing beneath the equipment keeps the air within the shroud dry.

It was determined that relative humidity within the building should be held to less than 50%. Gas-fired, overhead heating units, which were already installed in the building during its use for manufacture of gun barrels, were satisfactory for this purpose. Humidistats were set to turn heaters on when ambient temperature in the building dropped low enough to present a dangerous percentage of relative humidity. Usually, in the Gilroy area, extra heat is only required during the early morning hours.

Cycling of each piece of machinery —operating it at all speeds—is presently of questionable necessity in the thinking of ordnance officials. Purpose of cycling is to resurface oiled parts and inspection of coated surfaces. Experience has revealed that removal of shrouds and operation of the equipment often causes damage to coated surfaces. Therefore, costs of periodic operation of stored equipment, ordnance officials feel, may be out of balance with the benefits realized.

However, until research has been completed on this matter, machines at Be-Ge will be cycled every six months. During the operations of the machines, each is inspected for damage to preventative coating and patch applications are made if needed.

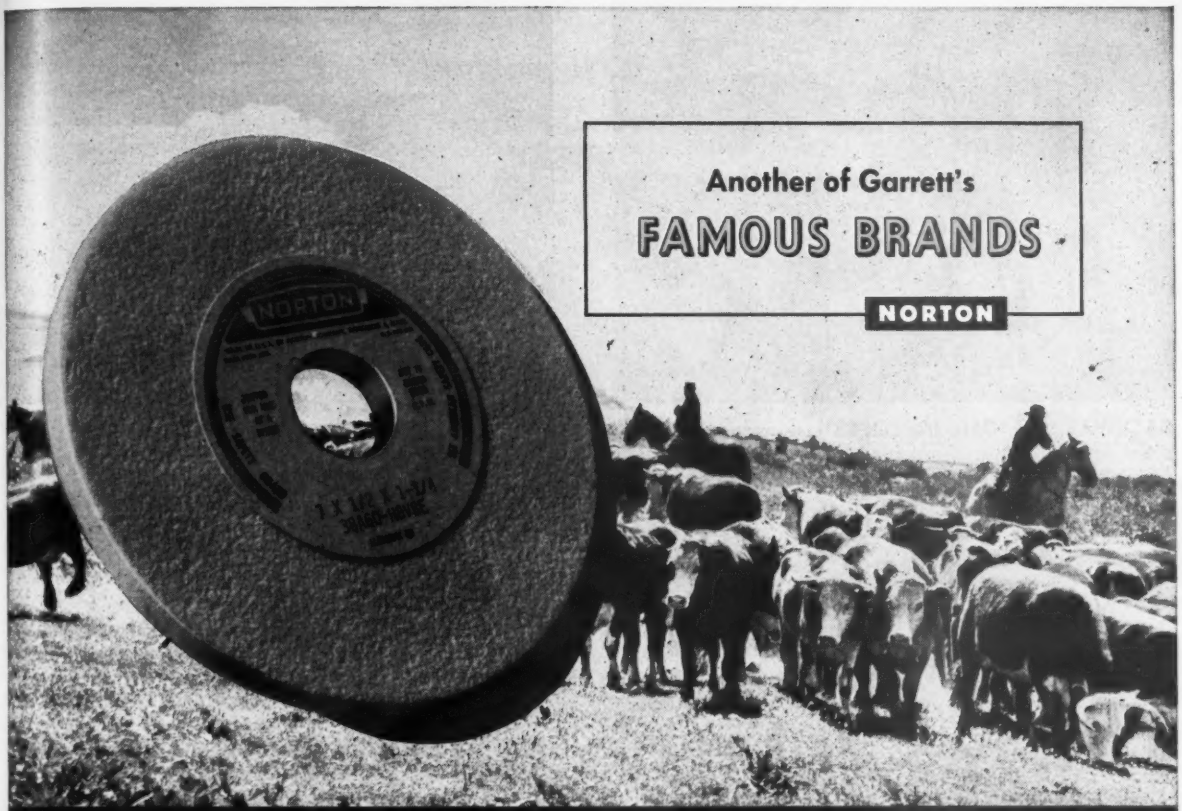
Through close cooperation and a free exchange of ideas, the actual cost of this layaway project was only 60% of the original bid costs, thus reflecting a substantial saving to the U. S. Government.

## Govt. purchasing directory available

PUBLISHED by the Small Business Administration, the U. S. Government Purchasing Directory lists "who buys what and where" and is designed to help the small plant sell to the government. One listing carries full address and activity data on all major military purchasing offices. A second section in the directory lists the items and services purchased by the principal military procurement offices.

Other sections include data on local purchases by military installations, major federal civilian purchasing offices, and how small plants can sell to the federal government.

Priced at 50c it is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.




# FINEST GRINDING WHEELS NOW MANUFACTURED IN WEST IN NEW NORTON PLANT!

Here is good news for Western industry! The Norton Company, largest manufacturer of abrasive products in the world, has established a completely equipped plant in Santa Clara, first of its kind in the West! Now your needs for grinding and abrasive tools can be served faster and better than ever before . . . through the Garrett Supply Company.

A full line of Norton products, covering every grinding wheel need, is in stock at Garrett. Norton is a new famous name in the more than 100 famous brands of tools and industrial supplies distributed by us. Whatever you need, "Get it from Garrett!"

***HEADQUARTERS IN SOUTHERN CALIFORNIA AND ARIZONA FOR THESE AND OTHER FAMOUS BRANDS***

**Allen Socket Screws**
**Chicago-Latrobe Drills**
**Lufkin Tools**
**Carboloy**
**Barber-Colman Hobs**
**Jacobs Chucks**
**Millers Falls**

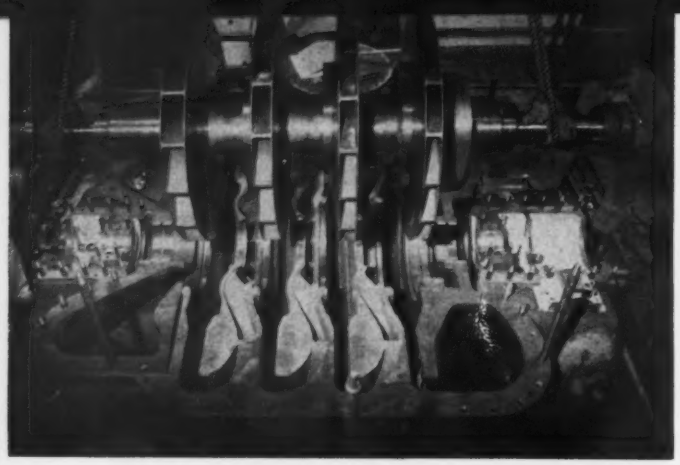
IN LOS ANGELES
**LUdlow 8-7221**
IN PHOENIX
**ALpine 8-5701**

# GARRETT
**SUPPLY COMPANY**

*3844 South Santa Fe Ave., Los Angeles 58, California*
*130 West Madison St., Phoenix, Arizona*

*a division of* **THE GARRETT CORPORATION**

*. . . for more details, circle No. 30 on Reader Service Postcard*



**BACKWARD BLADED IMPELLERS** are almost always used for multi-stage machines. As will be noted in Chart 2 on page 53, this type of compressor has different operating characteristics when compared to radial type designs.

**AXIAL TYPE ROTOR.** Machines of this type have a limited volume range of 90% at constant speed. However, availability of varied design features enables this machine to provide considerably greater latitude as shown in Chart 1, page 53.

**HOW-TO DATA ON**

# Today's rotating compressors

***Here's what centrifugal, axial, and sliding vane compressors can do for you, how to pick 'em, and useful maintenance data.***

COMPARATIVELY recent design advancements that have provided even greater reliability and continuity of operation have made the rotating type compressor more and more useful to industrial manufacturing and processing plants. However, selecting the right compressor to do a given job, installing it and keeping it running require a good knowledge of what the equipment will do and how it operates.

Due to the relatively high speed at which rotating-type compressors operate, physical dimensions are comparatively small. Vibration is low and shock load non-existant, so cumbersome and massive foundations are not needed for the machines. Maintenance is low on the units, generally; frictional components consist only of two journal bearings and, in some machines, one thrust bearing and sealing glands and interstage seals are the only close-tolerance elements involved.

### Types and capacities

Rotating-type compressors can be divided into major groups as shown in the following volume range table. However, a few other designs employing continuous rotation are available but will not be discussed in this article due to limited industrial applications.

VOLUME RANGE TABLE

| Group | Type Compressor | Approx. Volume Range (cfm.) |
|---|---|---|
| 1 | S.S. Centrifugal | 600 to 100,000 |
| 2 | M.S. Centrifugal | 1,000 to 150,000 |
| 3 | Axial | 8,000 to 1,400,000 or larger |
| 4 | Sliding Vane | 50 to 6,000 |

Minimum volumes shown in the volume range table for groups 2 and 3 are limited to low pressure ratios since the quantity of gas reaching the last stages of a centrifugal or axial compressor must still be large enough to permit good aerodynamic design.

The following data is pertinent only to single- and multi-stage centrifugal and axial compressors. Sliding-vane types, due to a wide difference in characteristics, will be discussed separately.

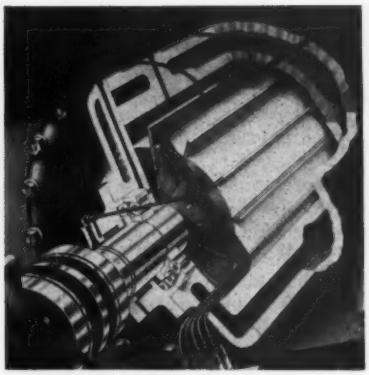
Minimum volume limitations as related to pressure ratio can be estimated by dividing the required inlet volume by the contemplated pressure


AUTHOR OF THIS ARTICLE

**JAMES H. PESTALOZZI**
Thermodynamics Engineer
Pacific Region
Allis-Chalmers Manufacturing Co.

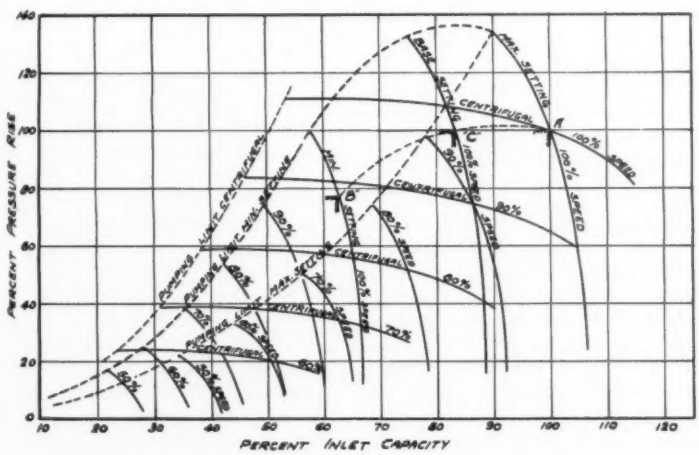
**Mr. Pestalozzi draws upon practical engineering experience—15 years in the West alone—to detail this selection, installation, and maintenance data on rotary compressors used in plant operation. His article will be followed in July WESTERN INDUSTRY by similar ndustrial plant application data on reciprocating compressors by another Western engineer.**

# Rotating compressor characteristics



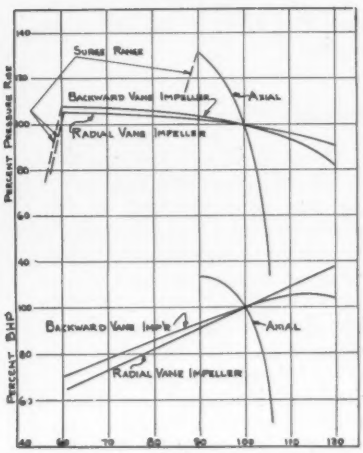
**COMPRESSOR DESIGNS VARY** as shown here. Most commonly used on single stage machines is the open radial vane type impeller (above left). Others are sliding vane type (above right), enclosed backward bladed impeller design (left on facing page), and axial design (right on facing page). Each of these general designs presents different pressure volume and horsepower characteristics as shown for the first three types in the performance comparison chart (Chart 2). The axial machine has a comparatively small volume range whereas both the radial and backward bladed impellers have considerable latitude in volume range for a lesser range in pressure rise at constant speed. Dotted lines in this chart denote surge ranges for each design. Stable ranges are to the right of the surge lines.

**Chart 1 (Axial compressor performance)**



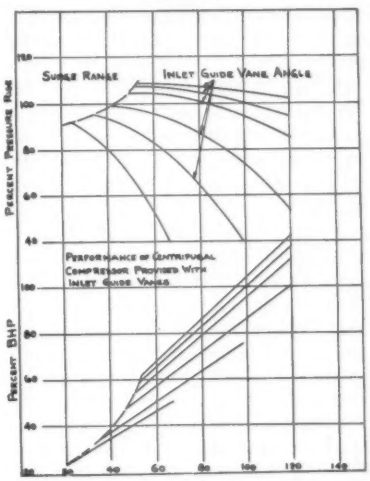

**EQUIPPED WITH INLET GUIDE VANES** a centrifugal machine can operate to about 30% of rated inlet volume before going into surge and the unstable operating point can be brought down to about 50% volume by means of stator blade control on axial machines. (See Charts 1 and 3). A centrifugal compressor will have a stable range at design speed down to approximately 70% of volume for six stage ranging to about 50% of volume for two stage compressors. (See Chart 4).

**Chart 2**



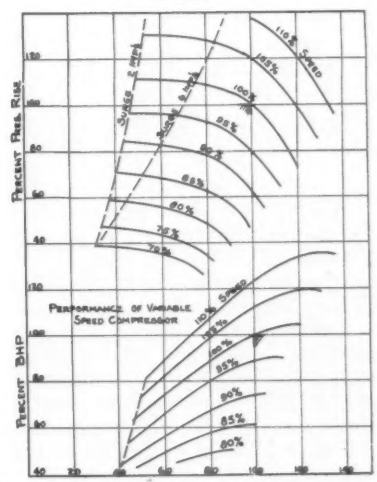

**COMPARISON OF PERFORMANCE**

**Chart 3**


SURGE RANGE
INLET GUIDE VANE ANGLE
PERFORMANCE OF CENTRIFUGAL COMPRESSOR PROVIDED WITH INLET GUIDE VANES
PERCENT PRESSURE RISE
PERCENT BHP

**PERCENT VOLUME**

**Chart 4**




**PERCENT VOLUME**

ratio. If the value thus obtained falls below 600 cfm. for a centrifugal or below 400 cfm. on an axial machine the application does not usually fit presently available equipment or would at least be subject to special study.

### Pressure rise

Pressure rise which can be obtained is limited by the feasible length of the rotating element; that is, by the number of impellers or the number of axial stages which can be conveniently mounted on a single shaft.

For good design the number of impellers are usually limited to seven or eight on a centrifugal compressor or to 16 stages of blades on an axial machine. Machines have been built which exceed these limits but presently available and standard designs favor these limitations.

An important consideration in the length of the rotating element is its critical speed. Machines with one, two, and sometimes three impellers and all axial machines are of stiff shaft construction. Their critical speed is above the operating speed, whereas multistage compressors from three to seven stages are of flexible construction and critical speed is below the operating speed.

When calculations show that a number of stages as above outlined must be exceeded, it is necessary to connect two or more units in tandem.

A good method to approximate the number of stages necessary to compress a gas is to remember that a head (H) of about 8 to 9,000 ft. can be accommodated by one impeller or about 4,000 ft. by one row of axial blading.

The total head (H) in feet for compressing a gas can be determined from:

$$Hg = \frac{k}{k-1} RT_1 \left[ \left( \frac{P_2}{P_1} \right)^{\frac{K-1}{k}} - 1 \right]$$

or for air

$$Ha = 188.2\ T_1 \left[ \left( \frac{P_2}{P_1} \right)^{.283} - 1 \right]$$

Where k is the isentropic exponent for gas (1.395 for air), R the gas constant (53.3 for air) and $T_1$ the absolute temperature or 460 plus deg. F. inlet temperature.

Assuming, for instance, that calculations show that a total head of 60,000 ft. is required to compress a gas, it is at once apparent that a single machine with about seven impellers or 15 axial stages can do the job.

Since the compression factor

$$\left[ \left( \frac{P_2}{P_1} \right)^{\frac{k-1}{k}} - 1 \right]$$

(not to be confused with the compressability factor) is used in subsequent relations, it will be denoted with the letter X.

Inlet pressure of a centrifugal compressor can be from any value approaching zero psia. to 700 or 800 psia. whereas axial machines have an inlet pressure range of 0 to 45 psia. Obviously the values given can be exceeded for special applications and only serve as a guide to presently available and standard equipment. For instance, units are in service combining a number of tandem connected machines exhausting at 2,500 psia. where the inlet pressure to the last machine is 1,200 psi.

### Rotational speed

Speed at which a compressor must operate is largely determined by the required inlet volume in that the impeller diameter and width or, as in the case of the axial machines, the annular area dictated by the blade height and drum diameter must be proportioned for the best aereodynamic flow. For commercial applications tip speeds are selected of between 600 to 800 ft. per sec. with 860 ft. per sec. as a maximum. Therefore, a small volume machine requiring small passage impellers will have a higher rotational speed than a large volume machine.

Referring to the volume range table, centrifugal machines of groups 1 and 2 have a speed range of from 2,500 to 14,000 rpm. and axial machines speeds range from 1,300 to 17,000 rpm. From this discussion it can be seen that a great number of applications require the use of speed increasing gears between driver and compressor.

### Temperature rise

Temperature rise of a gas as it is compressed is often a point of interest, especially when handling volatile gases or gases in which polymerization-caused fouling of the internal compressor components may occur at certain temperatures. Temperature rise also affects selection of compressors when it comes to materials used in construction.

Temperature rise, $\Delta T$ for an uncooled compressor, can be estimated from the relation

$$\Delta T = \frac{T_1 X}{\text{Efficiency}}$$

where $T_1$ is the absolute inlet temperature (deg. F. plus 460) and X the compression factor. For approximation, an efficiency of 70% can be used.

Where two or more uncooled compressors are connected in series it is accepted practice to cool the gas as it is passed from one machine to the next through use of a tube type heat exchanger large enough to obtain an exit gas temperature from the cooler of about 100 deg. F.

If it is desired to keep gas temperature at a lower level during compression in a single machine, it is done by providing circulating water jackets around the discharge passages of each impeller or by direct liquid injection into the gas stream either at the compressor inlet or into each stage.

The latter method is the most direct and effective, avoiding complicated cylinder design and sometimes rough water passages on which there is a tendency of fouling, where chemically impure circulating water must be used.

Direct liquid injection is in use on compressors handling paraffin hydrocarbon gases, coke oven gases, acetylene, etc. not only as a cooling medium but also as a cleaning agent where fouling to internal compressor components has been found troublesome.

Internal cooling also results in a slightly lower horsepower consumption, especially for machines with atmospheric and lower inlet pressures. In the case of higher inlet pressures the cooling effect for a given quantity of circulating or injection liquid becomes less effective because of the higher gas density and the correspondingly higher vapor pressure of the gas. Function of liquid injection for such cases is solely for the purpose of the cleansing action thus derived.

Adiabatic efficiency of centrifugal compressors varies widely depending on the inlet volume and somewhat on the pressure level at which a machine operates.

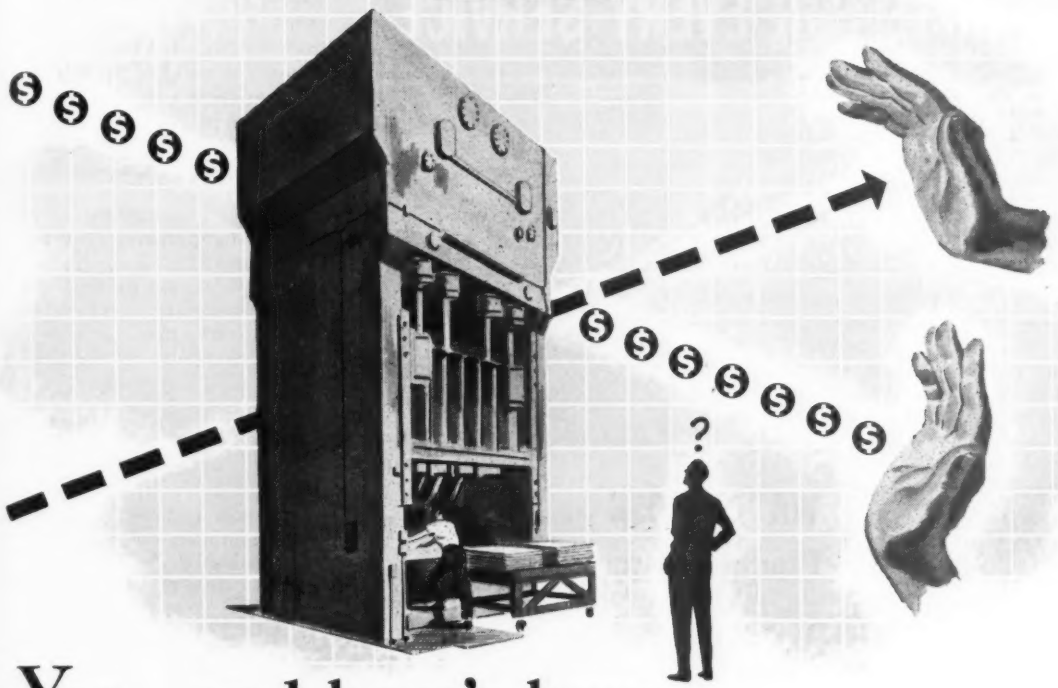
Referring again to the volume range table, centrifugal compressors of groups 1 and 2 have a range of adiabatic efficiency from 67% for the small inlet volume to about 75% for the large inlet volume machines. Axial compressors of group 3 show up considerably better in that efficiencies in excess of 80% are obtained.

Adiabatic horsepower required for compression is expressed by:

$$AHP = \frac{144}{33{,}000} \times \frac{k}{k-1} \times P_1 V_1 X$$

Where K again is the isentropic

# Can troubles in hydraulic systems be stopped before they get costly?



# Yes...and here's how Shell men and techniques do it with an oil

"Correct the *causes* of trouble in hydraulic systems"—that was the task Shell Research men set for themselves. *Do* something about oil oxidation that creates sludge and lacquer... interferes with smooth, dependable valve action. Cut down, too, on *rust* and fight *wear* so as to prolong pump life.

Shell scientists did all that when they developed SHELL TELLUS OIL. This oil contains specially developed and thoroughly proven oxidation and wear inhibitors. In plant after plant, this oil has proven its ability to resist oxidation and foaming... to lengthen pump life and save the thousands of dollars that are often lost through hydraulic breakdowns.

Shell Tellus Oil is just one of the many fine products developed by Shell's 1500-man research team—a team with 25 years' experience in lubrication problems.

A telephone call can put this team to work solving your problems. Call in your Shell representative today.

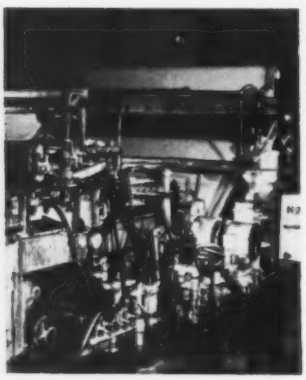
## SHELL TELLUS OIL

*... for more details, circle No. 31 on Reader Service Postcard*

# *Buy* GOODALL *and Save...* *on* HOSE FOR EVERY SERVICE

## AIR HOSE... For All Pneumatic Tools

The Goodall line includes quality Air Hose covering the full range of pneumatic tool applications . . . from chipping to heavy-duty rock drilling. "Subway," "Mine King," "37" and "Chipper" are names that mean *extra service* under the conditions for which each brand is designed.



## WATER HOSE . . . . . For Production and Wash-up

Name any application for Water Hose, and you'll find a Goodall brand that will fill the bill with outstanding reliability and economy. "Buckskin" and "Bellwood" will meet practically all cold-water requirements. Use "Cloverleaf" Creamery Hose for scalding water wash-up. Other special-purpose constructions include Paper Mill, Greenhouse, Car Wash and Deck Hose.

## "ALLSERV" *General-Purpose* HOSE...

**For Steam, Water, Air, Oil, Chemicals, Paint Spraying, etc.**

The adaptability of "Allserv" to such a wide variety of applications provides a sure way to keep hose inventory low. It is a very flexible all-"Synplastic"® molded-and-braided hose, in one, two, or three braid construction, with a tough wear-resistant red cover. Made in ¼" to 1½", for working pressures from 200 lb. to 300 lb.

**FIRE HOSE . . . in the new "FIRE-FLEX" construction. Much lighter and stronger. Stays "alive" on the reel.**

***"If it's GOODALL, it MUST be Good!"***

***Contact Our Nearest Branch for Details and Prices***

*Standard of Quality—Since 1870*

HOSE · BELTING · FOOTWEAR · CLOTHING AND OTHER INDUSTRIAL RUBBER PRODUCTS

# GOODALL *Rubber Company*

**GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.**

**Branches and Distributors Throughout the United States and in Canada**

***. . . for more details, circle No. 32 on Reader Service Postcard***


exponent of gas, $P_1$ the inlet pressure in pounds absolute, $V_1$ the inlet volume in cfm. and X the compression factor.

The adiabatic horsepower thus obtained needs only be divided by the compressor efficiency and the efficiency of a speed increasing gear if used to obtain the brake horsepower required to drive the compressor.

Attention is called to $P_1$ and $V_1$ appearing in the above horsepower equation which must be the values existing at the compressor inlet.

### Pressure-temperature relation

If any values other than actual inlet conditions existing at the compressor inlet are known they can be converted to these conditions by the simple relation:

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

which merely describes two different states of compression of a gas, whether it be in a different atmospheric state or that existing at the discharge of a comprssor or at the inlet or outlet of a cooler.

### Volume, pressure controls

Methods of extending the useful volume range of compressors can also be adapted to control pressure or volume for a constant speed motor driven machine as shown in Chart 3 on page 53. Controllers are available which receive their impulses from the given system requirements and are linked to the guide vane or movable stator blade mechanism to give continuous control for stable operation.

A steam turbine driver is perhaps the simplest and most flexible means of controlling a compressor where steam power is available. Not only can a steam turbine be designed in many cases to match the required speed of the compressor, thus eliminating a speed increasing gear, but inlet guide vanes and/or stator blade control mechanisms can be omitted. A typical performance curve is shown in the "Performance of Variable Speed Compressors" chart on page 53.

A third method of controlling compressor performance is by use of a by-pass arrangement from the compressor discharge to suction. While this is a simple and inexpensive device, it has the disadvantage of full horsepower consumption at all times. In the other method described the power input to the driver is a function of volume and pressure rise at a slightly de-

# *Ask the man with the gun*

The chances are you know him. You can find him in every plant and factory, every lumbering camp or construction site in America. And when he *points* that gun, wheels turn, gears mesh – things happen! All of industry moves on the grease-barrage he lays down.

Previously, it took a lot of different greases to do all the jobs the gunman had to do. Sometimes a single plant would stock as many as forty or fifty types! But now *one* multipurpose grease meets all these needs. That grease is Richfield Rocolube.

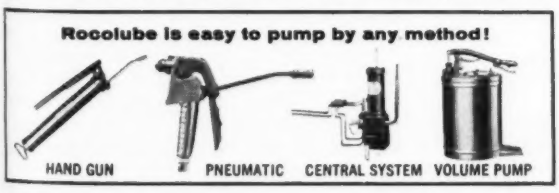
**HOW YOU BENEFIT**

Richfield Rocolube can be used to lubricate everything from a small electric motor to a locomotive...including conveyors, water pumps and airplanes . . . trucks, track rolls and construction equipment! You *need* no other grease. This means that you save money so many ways: fewer, larger purchases are possible...inventory can be reduced...and the chance for lubrication error is virtually eliminated.

In addition to being versatile – and competitively priced – Richfield Rocolube has other fine qualities. It works as well in arctic cold as in desert heat. It's waterproof, tough and also easy to pump.

**PICK UP YOUR TELEPHONE**

Call the Richfield office nearest you today. Let the lubrication expert there show you what grease gunmen have *proved* about new Richfield ROCOLUBE. Call now!

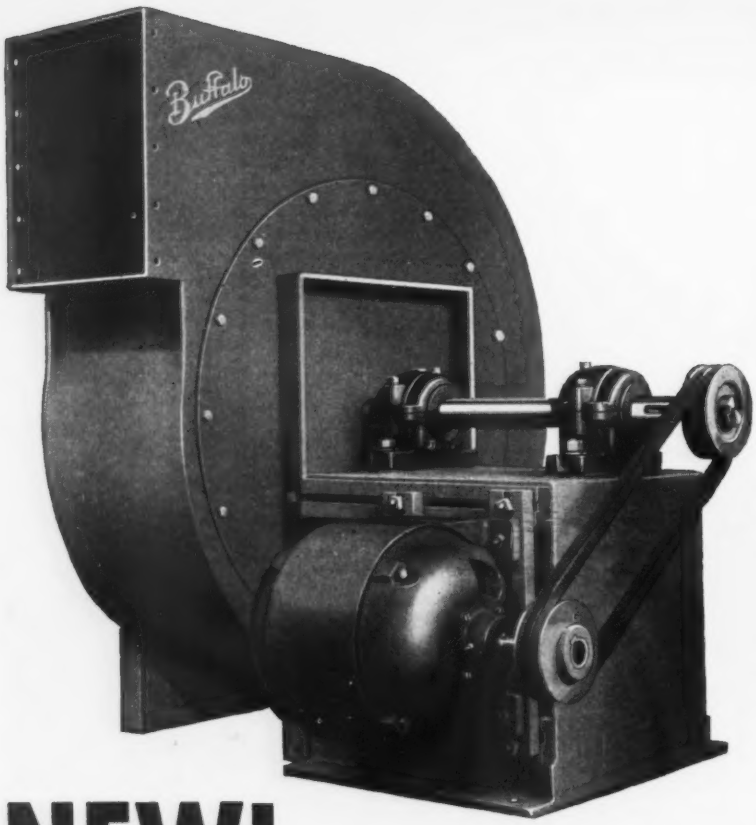



**RICHFIELD ROCOLUBE**
**ADVANCED MULTI-PURPOSE GREASE**

FINE INDUSTRIAL LUBRICANTS FOR EVERY NEED

**RICHFIELD**

*. . . for more details, circle No. 33 on Reader Service Postcard*




# NEW!

## WEST COAST STOCK TO BETTER SERVE "BUFFALO" CUSTOMERS!

You can now get *stock delivery* on a number of "Buffalo" Fans and Blowers from our newly established warehouse in the San Francisco Bay Area.

To better serve our many customers in the western states, we have Industrial Exhausters, "E" Blowers, Volume Fans, Vent Sets, "BL" Fans, Vaneaxial Fans, and direct-connected and belted propeller fans stocked there, in a wide range of sizes.

Your air handling and conditioning requirements are best met with "Buffalo" equipment, based on our nearly 80 years experience in the field. Contact any "Buffalo" Representative in the western states for prompt delivery of standard "Buffalo" Fans.

***For information about these husky exhausters ask for Bulletin 3576.***

"Buffalo"

**BUFFALO FORGE COMPANY**
BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

***. . . for more details, circle No. 34 on Reader Service Postcard***

creased efficiency for other than the rated point. The bypass arrangement is used in conjunction with variable speed or guide vane control devices to avoid operation in the surge range. A fourth method widely employed to control volume or pressure rise is the use of a hand controlled or automatic suction throttling valve where the horsepower consumption will vary with capacity of the compressor.

### Lubrication and sealing

In the majority of applications force-feed lubrication is used where oil is delivered under pressure to all bearings of the compressor, speed increasing gear, if used, and the driver. The main oil pump can be a part of the speed increasing gear, coupled or geared to the compressor rotating element or turbine shaft or arranged as a separate motor or steam driven pump. An additional auxiliary full capacity oil pump is normally used and is arranged to start and stop from impulses received by pressure switches in the oil lines when the oil pressure reaches a predetermined low level. An oil reservoir, oil cooler and all piping, valves, thermometers and oil pressure gages are usually a part of a contract for compressor equipment.

Sealing glands for compressors are arranged so that the same pressure will prevail on both the high pressure and the low pressure gland. This is accomplished by an equalizing line which connects the inlet of the compressor to a space immediately behind the balance piston where the high pressure gland is located. For most air applications of average pressure the multiple touch point type labyrinth gland is used.

### Materials of construction

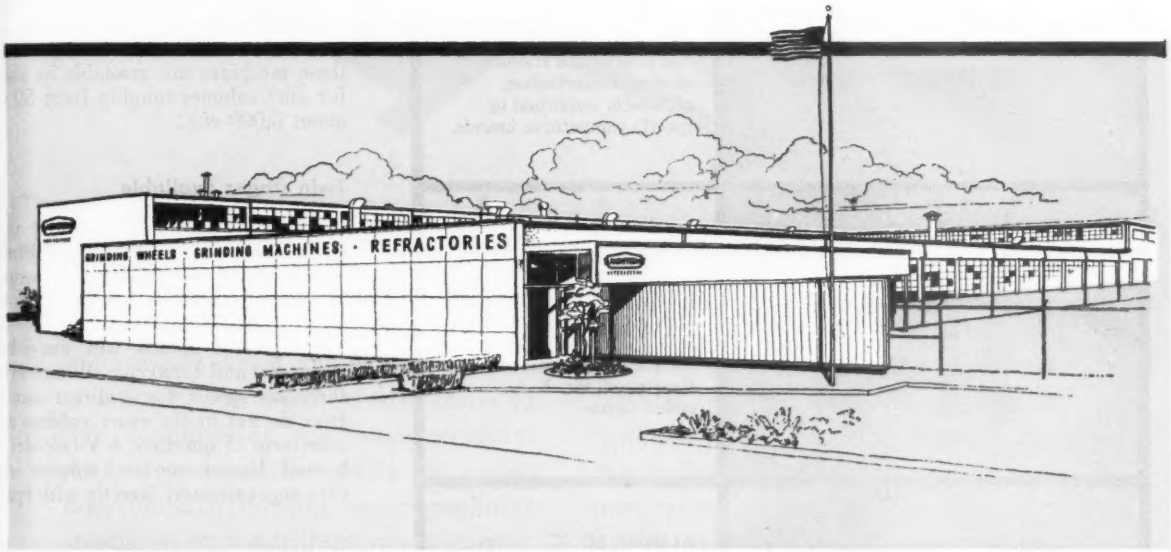
Considerations entering into the selection of a compressor as far as its construction is concerned are based on three major factors: pressure range, temperature range, and gas composition.

Standard materials for a compressor up to a discharge pressure of about 500 psi. where non-corrosive gases are handled and where the temperature will not exceed 450 deg. F. should be close grained cast iron for the casting and diaphragms, low carbon steel for the shaft and shaft sleeves and a high tensile steel alloy for the impellers. Labyrinth glands and interstage seals should be made from leaded bronze or stainless steel. Where the inlet temperature and/or the temperature rise will give an end

# Announcing the Opening of

# *A great new Norton plant*

## at Santa Clara, California




***Now West Coast industry has a California source of the world's leading abrasives — a great new grinding wheel plant — augmenting Norton services in abrasives, grinding machines, and refractories***

The new Norton plant at Santa Clara, Cal., is the largest, most modern grinding wheel plant on the Pacific Coast. It is producing a complete line of grinding wheels for the entire West Coast area — with expanded service that means new convenience for every customer.

*Thus, West Coast industry becomes self-sufficient with respect to the availability and servicing of abrasive products — and makes an important gain in its competitive position.*

Both the new Norton plant and its products are geared specifically to West Coast requirements. This is local manufacturing in the truest sense, further strengthening the following Norton services west of the Rockies:

Forty-five trained engineers located in eight cities in the West Coast area.

A vast, highly efficient distributor network.

Now, Norton West Coast distributors have gained the added advantage of 2400 miles. Each one of them is the breadth of a continent closer to a major source of supply. Each is now enabled to give you even better service along with the world's finest abrasives.

**NORTON**

**ABRASIVES**

*Making better products...to make your products better*

NORTON COMPANY, SANTA CLARA, CALIFORNIA

*General Offices at Worcester, Mass.*

*District Offices:* Chicago • Cleveland • Detroit • Los Angeles • New York • Philadelphia • Pittsburgh • St. Louis • West Hartford, Conn.

*Distributors in all industrial areas*

***... for more details, circle No. 35 on Reader Service Postcard***

value of over 450 deg. F or where 500 psi. inlet or discharge pressure is exceeded a cast steel or sometimes forged steel casing is necessary.

For corrosive gases or where gases carry abrasive solids, stainless steel construction is sometimes necessary.

Journal and thrust bearings should, in most cases, be the Babbitt-lined type which have proven to give long and reliable service.

### Sliding vane compressors

Principle of operation of the sliding vane-type compressor is based on an eccentrically located shaft provided with slots in which vanes slide in a radial direction. As rotation is imparted to this shaft centrifugal force holds the vanes against the casing. As one vane passes by the inlet port, a given quantity of air or gas is drawn into the space between this vane and the adjacent one. Compression takes place as the volume is continuously decreased during one revolution, consistent with the eccentric position of the rotor and the casing until the vane has reached the discharge port where the gas is expelled to the system.

Since the vanes are in direct sliding contact with the periphery of casing, lubrication is required and is accomplished with a drop feed lubricator driven from the compressor shaft. This same lubricator also delivers oil to the two roller bearings.

A circulating water system provides cooling to the jacketed cylinder casing.

### Pressure characteristics

The pressure rise for a single stage compressor is from about 5 to 50 psi. for all but the largest machines where the pressure rise is limited to 30 psi. This is due to the stress limitations of the larger vanes used in the bigger machines.

The same machines can be used for vacuum service although a gain in efficiency will result if the inlet ports are specially designed for vacuum application.

As seen in the volume range table these machines are available in sizes for inlet volumes ranging from 50 to about 6,000 cfm.

### Twin stages available

Where a pressure rise of 50 psi. must be exceeded twin stage machines are available up to 125 psi. pressure rise in ranges of inlet volumes of from 200 to 2.000 cfm.

Compressor speeds will vary between 400 and 1,800 rpm. Where synchronous speeds for a direct motor drive do not fit the exact volume requirement in question, a V-belt drive is used. Horsepower and volume will vary approximately directly with rpm.

### Machines must be kept clean

These machines have a great variety of applications and selected for the right application, will give continuous and reliable service. It should be kept in mind, however, that only clean and non-corrosive gases can be compressed successfully due to their construction and principle of operation. Presence of dust or other corrosive agents or polymerization where hydrocarbon gases are concerned are almost sure to cause trouble due to excessive wear or sticking of the vanes.

Another consideration is the presence of a slight amount of oil vapor in the medium pumped. The oil consumption of these compressors is approximately 2 to 3 qt. per 24-hr. period and, even though a discharge oil trap can be furnished, about 30% of the lubricating oil will still remain in the discharged gas and can only be eliminated by the use of special filters requiring frequent replacement.

In 1954, it looked as if Mr. X's new product would never "get off the ground." True, there was competition, but research had predicted a friendly market. Nevertheless, architects continued to specify competitive brands.

In 1955, Mr. X found that most architects *would* specify his brand, provided they could SEE a product advantage, preferably a unique design feature. Heartened, Mr. X called Caine.

At Caine, Mr. X re-designed an important section of his product, having found in roll forming almost unlimited versatility. Result: a unique, patentable "shape," the all-important product advantage at less cost.

CASE HISTORY #2

**HOW TO "FORM" A SMILE**

**Read how Caine Steel made a new man of Mr. X by putting new life into his product.**

*Selling in a tough market? Planning a new product? Well-chosen, cold-roll formed "shapes" have solved many a difficult problem for Western executives. Today, get the facts on roll-forming from a Caine Steel representative.*

**CAINE STEEL CO.**
ROLL FORMING DIVISION
Los Angeles, 2451 E. 23rd St., LUdlow 8-1211
Emeryville, 1289 65th St., HUmbolt 3-0900

*. . . for more details, circle No. 36 on Reader Service Postcard*

# *Does your production line end here?*

Not by a long way! Your products have to move out over a complicated network of cities, towns and cross-road stores to the consumers in your sales territory. And, if you want to obtain the widest possible distribution, your products should go by a distribution-type carrier.

That's the kind of carrier CF is. CF daily *serves more points direct than any other carrier in the west.*

We appreciate that in today's highly competitive market, distribution is simply an extension of your production line . . . that your product must be kept moving out "to market" swiftly. And to help you meet this problem, CF has a ready-made distribution-type motor freight system available to you . . . the convenience of a private fleet with the economy of the common carrier.

Yes, for LTL* or full load, one shipment or many, CF's objective is to provide you with direct . . . sure . . . economical distribution. Call CF today!

*Less Than Truck Load

**SEATTLE • PORTLAND • SAN FRANCISCO • OAKLAND**
**LOS ANGELES • SPOKANE • SALT LAKE CITY**
**MINNEAPOLIS-ST. PAUL • CHICAGO**

Terminals in 49 other key cities from the Pacific Coast to the Great Lakes...Thru service to all major eastern cities.

• • • Foster Freight Lines, a subsidiary of CF serving Indianapolis, St. Louis, Louisville, Cincinnati, Dayton.

*. . . for more details, circle No. 37 on Reader Service Postcard*

# METAL & THERMIT

## a dependable source for special

# Chemicals & Metals

Buyers of chemicals and other products derived from tin, antimony, and zirconium have learned to depend on one reliable source—Metal & Thermit, whose nationwide warehouse and sales facilities assure them prompt delivery and dependable service.

Make Metal & Thermit *your* one source for:

**TIN CHEMICALS**— Metal & Thermit is the world's principal supplier of inorganic and organic tin chemicals.

**ANTIMONY CHEMICALS**— Metal & Thermit is a leading producer of high quality antimony chemicals including antimony oxide, sodium antimonate and potassium pyroantimonate.

**ZIRCONIUM PRODUCTS**— ULTROX® zirconium opacifiers for ceramic glazes and other M&T zirconium products are of unvarying quality.

**CHROMIUM, FERRO-TITANIUM, NICKEL-TITANIUM** — of carefully controlled analysis.

When you need any of these special chemicals and metals, it will pay you to give us a call.

TIN & TIN CHEMICALS
CERAMIC MATERIALS
ORGANIC COATINGS
WELDING SUPPLIES
RADIOGRAPHIC EQUIPMENT
PLATING MATERIALS
METALS & ALLOYS
HEAVY MELTING SCRAP

*"First Name in Tin Chemicals"*

**METAL & THERMIT**
**CORPORATION**

LOS ANGELES, CAL. SO. SAN FRANCISCO, CAL.

*. . . for more details, circle No. 38 on Reader Service Postcard*


# New nut saves dollars for Convair

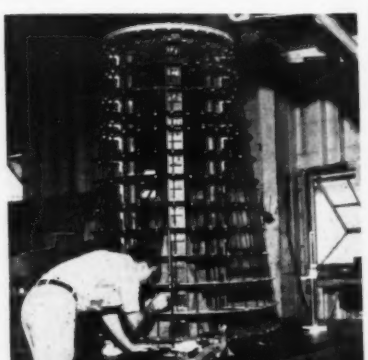
THOUSANDS of man-hours are being eliminated from construction of plaster models and mockups by a new type slip-squeeze nut developed and patented by Convair, San Diego, a division of General Dynamics Corp. Many more applications of the new fastening device are foreseen.

Many thousands of nuts are used to align spline or hidden templates in the fabrication of plaster models and master tools. A typical small model involves the use of 1,100 nuts to secure the entire template assembly. Many models require ten times this amount.

Vertical rods in the template assembly are threaded ¼-20. A nut is required on each side of the templates wherever the rod passes through. The nuts align the templates and lock them in place while plaster is being applied.

Shop practice has been to locate the standard nuts in proper positions by gripping one end of the threaded rod in a drill motor. The rod was then revolved while holding the nuts firmly. Using this time consuming method, each nut was ultimately threaded to its desired position.

New type slip-squeeze nuts are located immediately on any desired position on the rod, slipped into position and squeezed tight in one easy operation. A special tool is advisable for installation of the nuts. Pliers used at Convair are a reworked pair of vise-grips.



**1,100 NEW-TYPE NUTS** are used on this small model at Convair to align templates while plaster is applied. The new-type nuts are located easily in any desired position on the rod and squeezed tight. Special reworked vise-grips are used for speedy application.

**CONVERSION** from gasoline to liquefied petroleum gas power on 25 lift trucks at National Supply in Torrance, Calif., involved installing a fuel tank, filter, pressure converter, idle and power adjusting block, and fuel lines.

## LPG on 25 trucks saves $4,000

EXTENDED tests have indicated that when the National Supply Co., Torrance, Calif., conversion of 25 gasoline powered industrial trucks to liquefied petroleum gas operation has been completed, $4,000 a year will be saved. Even-out time for the cost of this conversion will be less than two years; present fuel consumption is about 400 gal. per year.

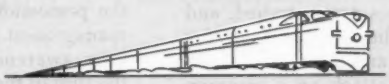
Kit used to complete conversion of each of the trucks is comprised of a gas tank, which is mounted on top of the truck, a fuel filter, a converter to reduce fuel pressure to 1½-lb. psi. and thus change the liquid to a dry gas, an idle and power adjusting block, and the necessary lines and fittings. The gasoline system remains operative and, after a quick resetting of the spark timing, can be used to power the trucks.

National Supply, using the trucks in its manufacture of oil, gas, and general industrial machinery, lists the following extra saving features expected after the LPG conversion has been completed:

1. Only half as much maintenance as previously encountered.
2. Almost complete elimination of noxious exhaust fumes.
3. Smoother and quieter operation.
4. Reduced engine wear; no carbon or lead deposits.
5. Longer life for engine oil due to elimination of oil dilution.
6. Longer spark plug life; no fouling elements present.
7. Elimination of detonation because of the high octane rating of the fuel.


WHY CARRY A LARGE INVENTORY?

GET IMMEDIATE SHIPMENT FROM...



Maas

Minimum transportation time from the largest producer with the most complete line of phosphates and photo-pure chemicals in the West.

BUY MIXED CARS FROM MAAS:

ARMOFOS (tripoly) • TRISODIUM PHOSPHATE

DISODIUM PHOSPHATE • DRI-TRI (anhyd. tsp)

TETRASODIUM PYROPHOSPHATE • MONOSODIUM PHOSPHATE

SODIUM ACID PYROPHOSPHATE

*Don't let large inventories be a burden.*
*Write for descriptive folder.*

A. R. MAAS CHEMICAL CO.
Division of Victor Chemical Works
4570 Ardine Street • South Gate, Calif.

*... for more details, circle No. 39 on Reader Service Postcard*

## EFFECTIVE MANAGERS . . . continued from page 39

We believe that written communications are essential and important and we have utilized the services of consultants hired from the outside to train management personnel in reading skills. In 24 hr. of training and practice, the reading speed of all those trained was just about doubled, and the comprehension rate was improved by about 15%. This is a decided pattern of results, almost without regard to the starting level of reading speed and comprehension. We consider it an important basic tool in keeping abreast of the new in management and in effectively utilizing time on the daily job. We have used outside help in cooperation with our own personnel to develop some principles of effective written communications and have published these in a simple booklet form for our own use and that of any of our friends in industry who may be interested. But most of all we believe that face-to-face communications are the best, the most common, and the most effective.

**"Regular meetings of supervisors and managers . . . for discussion of current company information is vital."**

In the small organization, regularly scheduled meetings of supervisors and managers for a dissemination, explanation, and discussion of company information of current nature is vital. We have used and are using the in-plant services of a consultant to train first-line supervisors and other managers in more effective face-to-face communications with groups of people, through departmental meetings aimed at common objectives such as safety, quality improvement, cost reduction, etc.

As an example of the use of this skill, consider our safety story. Every foreman has a 15-min. meeting on safety with members of his department every two weeks. Hazards are pointed out for correction, procedures are restudied, and basic principles of safety are re-emphasized. Any injuries or accidents are analyzed for cause and for ways to prevent recurrence. This kind of joint attack on a common problem within a two-year period reduced our accident frequency by 67%.

**"One aspect is more important than any other, perhaps all others. That is — participation."**

A third major factor of improving management performance is motivation. People, including managers, do not do what they ought to do because they ought to do it. They do what they want to do, and what they want to do is whatever they see as being necessary to satisfy their needs as they view those needs.

Human needs are many and varied, but some needs are common to all of us. In the work situation certainly these few are basic. First, the need for self-approval. This requires treatment which preserves one's essential individual human dignity and it requires a feeling that the work one is doing is worth while. Second, the approval of other people. In the work situation this means essentially being recognized by others for the contribution one is making. Third, a need for security both present and future. And fourth, a wish and a need to feel and to be a part of something important which is larger than self.

What does all of this have to do with improving the performance of the individual manager? A great deal, because on this basic interpretation of human nature rests our whole theory of motivation. It *is* possible to integrate individual goals and organizational objectives, but *only* if the individual can see quite clearly that by working toward organization objectives he most effectively works toward his own individual goals. The individual goals will always be the satisfaction of his own needs and he will always work toward these goals. So the question becomes, "How do we arrange for the individual manager to achieve his personal goals by working toward organizational objectives?"

There are many aspects of this problem and perhaps many methods which contribute to its solution, but we have found that one aspect is more important than any other, and perhaps more important than all others. This aspect is really a philosophical one and it can be summed up in one word—participation.

Let me list four methods or degrees of participation, the most important and desirable first. This would be the opportunity to participate in establishing the goals toward which the individual shall work. The second degree, if the first is impossible, is to participate in establishing methods which shall be used in working toward the goals established. If both of the first two are impossible, the third degree of participation is to establish and control the conditions under which the methods shall be used in working toward the goals. And finally, if all three of the first are impossible, then the individual can participate by discussing any changes that are to take place in the goals, methods, or conditions, before these changes take place.

**"The progress of the organization is the sum of the individual drives of members of the organization."**

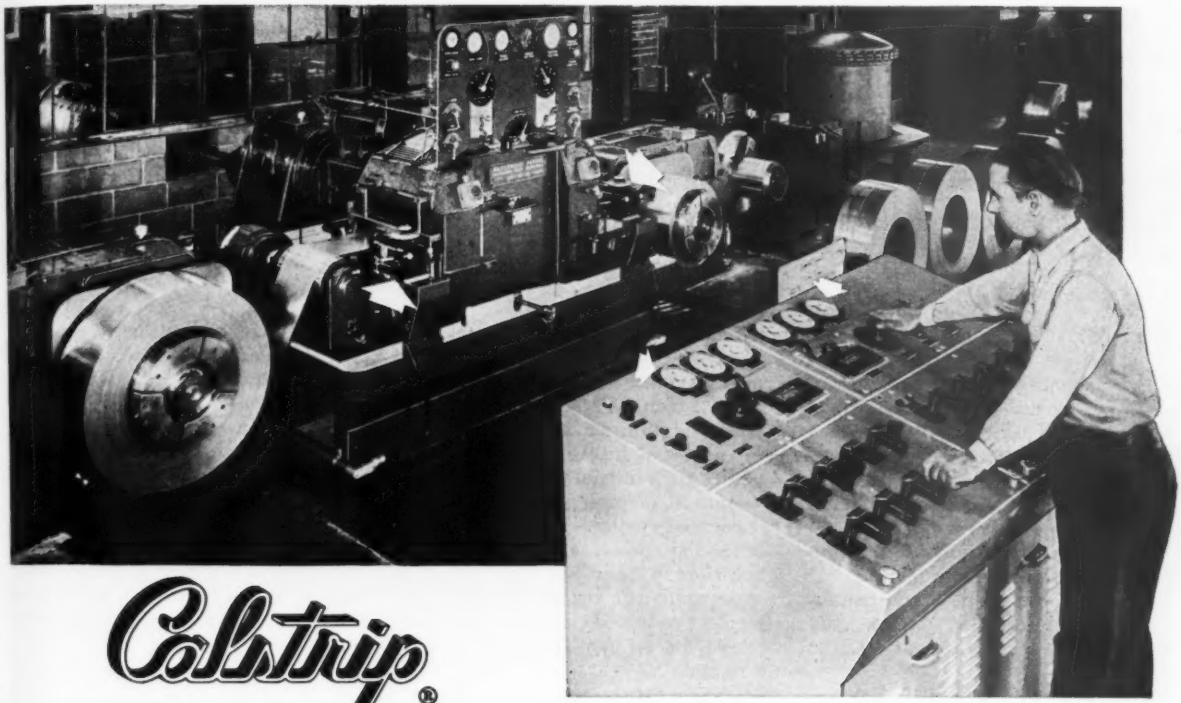
Does this mean that management should retire to the status of conference leaders? Not at all. This is the most difficult kind of management performance. In addition to the possession and use of what are normally considered management skills and abilities, it requires a constant and keen awareness that the progress of the organization is the sum of the individual drives of members of that organization, and that in the learning process by which every individual develops his capabilities there is no substitute for the experience of personal participation.

This is not a new or a revolutionary theory. It is merely the essence of what has been called democratic leadership. But to us it has an especially significant connotation in any discussion of management development. We believe that it is literally impossible to teach anybody anything. All we can hope to do is give people an opportunity to learn. This participative approach provides a maximum of opportunities to learn.

Development and habitual use of this management skill make it automatic for each manager to provide his subordinates continuously with a better orientation to the higher job. It enables each individual to learn through experience and, with skilled coaching, to analyze problems, determine policies, and establish practices having to do with his own job and responsibilities. At the same time, it challenges him with problems which are larger than his own and enables him to observe the methods of approach to those problems and to develop the insights necessary for dealing with these broader problems. In the development of managers, there is no substitute for the day-by-day counseling and coaching by superior of subordinate. There is no way to get this regular coaching done unless it is an automatic part of a method of management based on maximum participation.

# *CONTROL *to .0001"*

ONE REASON WHY



Calstrip®

ROLLS STRIP STEEL TO

*REALLY CLOSE TOLERANCES!"

Calstrip's new Sendzimir Mill is equipped with continuous indicating-recording gauges, which register thickness variations as slight as .0001". These highly sensitive gauges enable the operator to measure every inch of the steel as it passes through the mill. By means of controls that are instantly responsive, the mill can be regulated to produce a precision rolled strip right "on gauge" throughout the entire length of a coil. This thickness uniformity is carried on through coil after coil.

Our "Sendzimir rolled" strip also has these superior qualities:

- Thickness is uniform edge to edge.
- Strip is extremely flat.
- Hardness and mechanical properties are precisely controlled.
- Finish is fine grained, smooth and bright.

For high speed production of parts which are stamped, formed, or drawn — order Calstrip steel. Your plant will produce more parts per ton of steel with fewer rejects, and your products will function better and look better if made from Calstrip steel.

*Let us know about your requirements for low carbon, spring and alloy steel strip.*

Calstrip®

"THE WEST'S FIRST COLD ROLLED STRIP MILL"

STEEL CORPORATION • MILL AND OFFICES

7140 BANDINI BOULEVARD • LOS ANGELES 22, CALIFORNIA • TELEPHONE: RAymond 3-1344

*. . . for more details, circle No. 40 on Reader Service Postcard*

# 60 BEST VALVE & FITTING MANUALS

## —yours for the asking

***Here are reviews of the best available manuals covering valve and fitting selection and maintenance. Obtain your selection by circling item numbers on rip-out postcard.***

PRESENTED BELOW are concise abstracts of 60 manufacturer technical manuals covering all phases of just one group of products—valves and fittings. Packing in their pages a tremendous amount of know-how needed by specifiers and buyers of piping equipment, they are offered free of charge to key production and plant operating men in Western manufacturing and processing plants.

Collected over the past three months by the editors of WESTERN INDUSTRY as a special service to readers, the manuals reviewed here were selected to provide you with the latest and most complete information available anywhere on the great variety of valve types and fittings available today.

Valve and fitting design has kept pace with industrial progress—the development of piping techniques, and the ever-growing list of fluids for processing, power, and finished product. Here is the information you need to get up-to-date fast on these developments, and to make sure you have the latest data on hand for choosing the right valves and fittings to provide dependable and economical performance in each of the particular needs at your plant.

You are invited to check the listings on pages 66 through 73 quickly and select those manuals that promise to be most helpful with your valve and fitting problems. Circle appropriate key numbers on the WESTERN INDUSTRY Reader Service Postcard (on facing page), and we will be glad to see that you obtain your complete selection promptly.

### 304-page reference book on fittings and flanges

"Controlled Quality Fittings" is a 304-page general reference book on Ladish seamless welding and forged steel fittings, and forged flanges. Book devotes 200 pages to dimensions and specifications of large diameter flanges, TEMA flanges, long welding neck flanges, forged screwed and socket welding fittings, seamless welding fittings, forged steel flanges, forged weldless rolled rings, and stainless and alloy fittings. An engineering section of 56 pages contains technical data tables, including information on allowable stresses, P/S values and maximum working pressures, along with tables covering flow through orifices, properties of saturated and superheated steam, friction loss, properties of pipe, pressure-temperature ratings, and dimensional tolerances of fittings and flanges. The catalog is generally indexed for easy reference, and its seven main sections have pictorial indices and tables of contents. *Ladish Co.*

**. . . for your copy circle No. 150**

### How to choose the correct valve

"Choosing the Right Valve" is a 20-page compilation of facts necessary in making the correct valve choice. It describes the basic design features of the three principal types of valves—gate, globe, check. It also contains cut-away illustrations of these valves with principal valve parts pointed out. Gate and globe valve seating designs are discussed, as are disc-stem connection, bonnet and bonnet-joint characteristics, and variations in stem operation. Final section is devoted to the characteristics of common valve materials—brass, iron, steel. (Bulletin AD2016) *Crane Co.*

**. . . for your copy circle No. 151**

### 12-pages on PVC pipe fittings, flanges

This two-color booklet on pipe fittings and flanges opens with a discussion of the characteristics and advantages of PVC for pipe fittings and flanges, and goes on to give charts on corrosion resistance, physical properties, operating pressures and temperatures, and installation data. Booklet also contains thorough discussions of applications for the fittings, fabrication, and concludes with dimension and weight charts. *Grinnell Co., Inc.*

**. . . for your copy circle No. 152**

### 144-page handbook on safety, relief valves

This loose-leaf handbook opens with a discussion of the functions of safety and relief valves and is followed by valve selector charts. Sections devoted to safety valves include those of cast iron and steel in wing guided design and those of cast steel in top guided design. Six pages detail the Maxiflow safety valves in terms of design, parts and materials. Large sections cover iron and steel relief valves, bronze safety and relief valves, while other sections give information on iron and steel Y bases, mufflers, discharge elbow and drip pan unit, and power operated maintenance kits. Capacity tables, overpressure factor charts, and superheat correction factors are included. (Catalog 700A) *Manning, Maxwell & Moore, Inc.*

**. . . for your copy circle No. 153**

### 56-page data book on pressure regulators

This pressure regulator book, including reducing valves, pump pressure regulators, and back-pressure regulators, is divided into three sections: (1) regulating valves for general applications, (2) regulating valves for special applications, and (3) capacity tables. Information on air filters and pipe strainers is also included. About 25 reducing valves are detailed and illustrated, including those for steam, air, water, gas oil, and liquid service, while about 10 regulating valves are covered, including those for steam, gas, and liquid service. Book has fourteen capacity tables. (Catalog 77) *Mason-Neilan Regulator Co.*

**. . . for your copy circle No. 154**

### 28 charts on allowable working pressures

This 24-page chart book has allowable working pressure tables for many different kinds of piping, including power, district heating and boiler code piping, refinery and oil transportation piping, and industrial gas and air piping, using 15 different knds of Tube-Turn welding fittings. Book also includes a chart of the types and sizes of welding fittings and forged steel flanges made by Tube Turns and 27 small pictures of different fittings. (Bulletin TT640) *Tube Turns Div., National Cylinder Gas Co.*

**. . . for your copy circle No. 155**

# GET DATA AND LITERATURE YOU NEED

***Use one of these postpaid WESTERN INDUSTRY Reader Service Postcards. They provide a quick, easy way for you to get copies of literature you want and full details on products and services described editorially or advertised in this issue. Simply circle appropriate key numbers on card, sign, and drop it in the mail today—WESTERN INDUSTRY will have material sent to you promptly and without obligation.***

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

**BUSINESS REPLY CARD**
First Class Permit No. 3755, San Francisco, Calif.

*Postage will be paid by*

**WESTERN INDUSTRY**
**609 Mission St.**
**San Francisco 5, Calif.**

Western Industry

**READER SERVICE CARD—MAY 1956**
**Circle key numbers for data and literature you want, free of charge. Please mail before July 31, 1956.**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 26 | 51 | 76 | 101 | 121 | 141 | 161 | 181 | 201 | 221 | 241 | 261 | 281 | 301 | 321 |
| 2 | 27 | 52 | 77 | 102 | 122 | 142 | 162 | 182 | 202 | 222 | 242 | 262 | 282 | 302 | 322 |
| 3 | 28 | 53 | 78 | 103 | 123 | 143 | 163 | 183 | 203 | 223 | 243 | 263 | 283 | 303 | 323 |
| 4 | 29 | 54 | 79 | 104 | 124 | 144 | 164 | 184 | 204 | 224 | 244 | 264 | 284 | 304 | 324 |
| 5 | 30 | 55 | 80 | 105 | 125 | 145 | 165 | 185 | 205 | 225 | 245 | 265 | 285 | 305 | 325 |
| 6 | 31 | 56 | 81 | 106 | 126 | 146 | 166 | 186 | 206 | 226 | 246 | 266 | 286 | 306 | 326 |
| 7 | 32 | 57 | 82 | 107 | 127 | 147 | 167 | 187 | 207 | 227 | 247 | 267 | 287 | 307 | 327 |
| 8 | 33 | 58 | 83 | 108 | 128 | 148 | 168 | 188 | 208 | 228 | 248 | 268 | 288 | 308 | 328 |
| 9 | 34 | 59 | 84 | 109 | 129 | 149 | 169 | 189 | 209 | 229 | 249 | 269 | 289 | 309 | 329 |
| 10 | 35 | 60 | 85 | 110 | 130 | 150 | 170 | 190 | 210 | 230 | 250 | 270 | 290 | 310 | 330 |
| 11 | 36 | 61 | 86 | 111 | 131 | 151 | 171 | 191 | 211 | 231 | 251 | 271 | 291 | 311 | 331 |
| 12 | 37 | 62 | 87 | 112 | 132 | 152 | 172 | 192 | 212 | 232 | 252 | 272 | 292 | 312 | 332 |
| 13 | 38 | 63 | 88 | 113 | 133 | 153 | 173 | 193 | 213 | 233 | 253 | 273 | 293 | 313 | 333 |
| 14 | 39 | 64 | 89 | 114 | 134 | 154 | 174 | 194 | 214 | 234 | 254 | 274 | 294 | 314 | 334 |
| 15 | 40 | 65 | 90 | 115 | 135 | 155 | 175 | 195 | 215 | 235 | 255 | 275 | 295 | 315 | 335 |
| 16 | 41 | 66 | 91 | 116 | 136 | 156 | 176 | 196 | 216 | 236 | 256 | 276 | 296 | 316 | 336 |
| 17 | 42 | 67 | 92 | 117 | 137 | 157 | 177 | 197 | 217 | 237 | 257 | 277 | 297 | 317 | 337 |
| 18 | 43 | 68 | 93 | 118 | 138 | 158 | 178 | 198 | 218 | 238 | 258 | 278 | 298 | 318 | 338 |
| 19 | 44 | 69 | 94 | 119 | 139 | 159 | 179 | 199 | 219 | 239 | 259 | 279 | 299 | 319 | 339 |
| 20 | 45 | 70 | 95 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 |
| 21 | 46 | 71 | 96 | | | | | | | | | | | | |
| 22 | 47 | 72 | 97 | | | | | | | | | | | | |
| 23 | 48 | 73 | 98 | | | | | | | | | | | | |
| 24 | 49 | 74 | 99 | | | | | | | | | | | | |
| 25 | 50 | 75 | 100 | | | | | | | | | | | | |

*(Please print or type)*

NAME_____

TITLE_____

COMPANY_____

_____

ADDRESS_____

_____

_____

# WHAT'S YOUR PROBLEM TODAY?

*Make use of* **WESTERN INDUSTRY'S** *special service to readers. These business reply cards save you time, effort and expense in obtaining literature you want and full details on products and services described or advertised in this issue.*

*In addition,* **WESTERN INDUSTRY** *will help you locate sources of information concerning unusual plant operating problems that you may have. Write and describe your problem briefly, to: Editor,* **WESTERN INDUSTRY**, *609 Mission St., San Francisco 5, Calif.*

Western Industry

**READER SERVICE CARD—MAY 1956**

**Circle key numbers for data and literature you want, free of charge. Please mail before July 31, 1956.**

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 26 | 51 | 76 | 101 | 121 | 141 | 161 | 181 | 201 | 221 | 241 | 261 | 281 | 301 | 321 |
| 2 | 27 | 52 | 77 | 102 | 122 | 142 | 162 | 182 | 202 | 222 | 242 | 262 | 282 | 302 | 322 |
| 3 | 28 | 53 | 78 | 103 | 123 | 143 | 163 | 183 | 203 | 223 | 243 | 263 | 283 | 303 | 323 |
| 4 | 29 | 54 | 79 | 104 | 124 | 144 | 164 | 184 | 204 | 224 | 244 | 264 | 284 | 304 | 324 |
| 5 | 30 | 55 | 80 | 105 | 125 | 145 | 165 | 185 | 205 | 225 | 245 | 265 | 285 | 305 | 325 |
| 6 | 31 | 56 | 81 | 106 | 126 | 146 | 166 | 186 | 206 | 226 | 246 | 266 | 286 | 306 | 326 |
| 7 | 32 | 57 | 82 | 107 | 127 | 147 | 167 | 187 | 207 | 227 | 247 | 267 | 287 | 307 | 327 |
| 8 | 33 | 58 | 83 | 108 | 128 | 148 | 168 | 188 | 208 | 228 | 248 | 268 | 288 | 308 | 328 |
| 9 | 34 | 59 | 84 | 109 | 129 | 149 | 169 | 189 | 209 | 229 | 249 | 269 | 289 | 309 | 329 |
| 10 | 35 | 60 | 85 | 110 | 130 | 150 | 170 | 190 | 210 | 230 | 250 | 270 | 290 | 310 | 330 |
| 11 | 36 | 61 | 86 | 111 | 131 | 151 | 171 | 191 | 211 | 231 | 251 | 271 | 291 | 311 | 331 |
| 12 | 37 | 62 | 87 | 112 | 132 | 152 | 172 | 192 | 212 | 232 | 252 | 272 | 292 | 312 | 332 |
| 13 | 38 | 63 | 88 | 113 | 133 | 153 | 173 | 193 | 213 | 233 | 253 | 273 | 293 | 313 | 333 |
| 14 | 39 | 64 | 89 | 114 | 134 | 154 | 174 | 194 | 214 | 234 | 254 | 274 | 294 | 314 | 334 |
| 15 | 40 | 65 | 90 | 115 | 135 | 155 | 175 | 195 | 215 | 235 | 255 | 275 | 295 | 315 | 335 |
| 16 | 41 | 66 | 91 | 116 | 136 | 156 | 176 | 196 | 216 | 236 | 256 | 276 | 296 | 316 | 336 |
| 17 | 42 | 67 | 92 | 117 | 137 | 157 | 177 | 197 | 217 | 237 | 257 | 277 | 297 | 317 | 337 |
| 18 | 43 | 68 | 93 | 118 | 138 | 158 | 178 | 198 | 218 | 238 | 258 | 278 | 298 | 318 | 338 |
| 19 | 44 | 69 | 94 | 119 | 139 | 159 | 179 | 199 | 219 | 239 | 259 | 279 | 299 | 319 | 339 |
| 20 | 45 | 70 | 95 | 120 | 140 | 160 | 180 | 200 | 220 | 240 | 260 | 280 | 300 | 320 | 340 |
| 21 | 46 | 71 | 96 | | | | | | | | | | | | |
| 22 | 47 | 72 | 97 | | | | | | | | | | | | |
| 23 | 48 | 73 | 98 | | | | | | | | | | | | |
| 24 | 49 | 74 | 99 | | | | | | | | | | | | |
| 25 | 50 | 75 | 100 | | | | | | | | | | | | |

*(Please print or type)*

NAME_____

TITLE_____

COMPANY_____

_____

ADDRESS_____

_____

_____

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

**BUSINESS REPLY CARD**

First Class Permit No. 3755, San Francisco, Calif.

*Postage will be paid by*

**WESTERN INDUSTRY**

609 Mission St.

San Francisco 5, Calif.

**192-p**
Divi
192-pag
fabrica
60 pag
caps, v
contur-
the sec
Section
(Catal

**Pocke**
This
Watso
and so
150-lb.
line of
materi
*tings*

**PVC**
This
valves
have
wheel
while
weigh
includ

**72-p**
Nec
trial
tions
given
prima
servic
drawi

**Info**
All
ough
in ch
cross
of va
*cox*

**22-**
Ov
char
caps
piec
catio
*Fitti*

**36**
Th
corr
mad
Hast
expl
incl
men
letin

**Da**
T
trap
F. T
sect
two

**Sp**
(
are
of
wei
pra
fla
ma
and

**M**

### 192-page hard cover book on fittings, flanges

Divided into five sections and indexed for easy reference, this 192-page books covers welding fittings, forged steel flanges, prefabricated piping, pipe coils, and design data. Section 1 includes 60 pages on elbows, return bends, tees, laterals, crosses, reducers, caps, saddles, sleeves, nipples, rings, wrought iron fittings, and contur-ells. Bends and lapped and flanged joints are covered in the second section, while welded joints and nozzles are treated in Section 3. The last sections include pertinent charts and diagrams. (Catalog 54) *Midwest Piping Co., Inc.*

. . . for your copy circle No. 156

### Pocket book on complete Watson fittings line

This 12-page pocket-sized book contains information on all Watson-Stillman Fittings products, including forged steel screw-end and socket-welding fittings, forged stainless and alloy steel fittings, 150-lb. stainless fittings, unions, and special fittings, as well as a line of hydraulic pumps and jacks. Size ranges, types, construction materials, and design features are included. *Watson-Stillman Fittings Div., H. K. Porter Co., Inc.*

. . . for your copy circle No. 157

### PVC valves and fittings application data

This booklet describes Luncor all-molded, corrosion-resistant valves and fittings, and lists over 250 chemicals to which the valves have resistance. A cut-away drawing illustrates the valve handwheel, packing nut, packing, bonnet, body, stem, gasket, and disc, while charts give valve dimensions, and fitting dimensions and weights. A comparison of PVC to metals for valves and fittings is included. (Circular 601) *Lunkenheimer Co.*

. . . for your copy circle No. 158

### 72-page data book on Republic industrial valves

Needle, globe, plug, check, relief, selector, aviation, and industrial valves are thoroughly detailed in this catalog, which has sections devoted to each type. Engineering data and specifications are given for many different types of valves, which have been designed primarily for pneumatic, hydraulic, and instrumentation types of service. Dimensions charts, flow data charts, photographs, and drawings are included. (Catalog 654A) *Republic Manufacturing Co.*

. . . for your copy circle No. 159

### Information on seamless welding fittings

Alloy, carbon, and stainless seamless welding fittings are thoroughly detailed in this six-page leaflet, which includes information in chart form for elbows, returns, tees, reducers, caps, stub ends, crosses, laterals, nipples, saddles, and sleeves. Twenty-two pictures of various fittings are included. (Bulletin FB500) *Babcock & Wilcox Co.*

. . . for your copy circle No. 160

### 22-page loose-leaf book on Pacific line

Over half of this book is devoted to pictures and size and weight charts for Pacific's fittings, which includes elbows, tees, crosses, caps, plugs, bushings, flanges, reducers, nuts, locknuts, extension pieces, joints, etc. The opening pages of the book picture applications and testing procedures for the fittings. (Catalog 55) *Pacific Fittings Div., General Metals Corp.*

. . . for your copy circle No. 161

### 36 pages on corrosion-resistant valves

This 36-page book, covering the line of Rockwell-Nordstrom corrosion-resistant valves for process industries, discusses valves made of steel, bronze, Mercoloy, stainless steel, nickel, Monel, and Hastelloy. The Nordstrom principle of valve operation is thoroughly explained and illustrated. A list of applications of these valves is included, along with complete charts of metal and lubricant recommendations, illustrations, sectional drawings, and dimensions. (Bulletin V217) *Rockwell Manufacturing Co.*

. . . for your copy circle No. 162

### Data on thermodynamic steam traps

This data folder lists special features of thermodynamic steam traps for pressures from 10 to 600 psi. and temperatures to 950 deg. F. Traps are illustrated and a capacity chart is included. A small section is also devoted to pipe line strainers, with specifications for two different types. (Bulletin 257B) *Sarco Co. Inc.*

. . . for your copy circle No. 163

### Specification sheet on tube unions

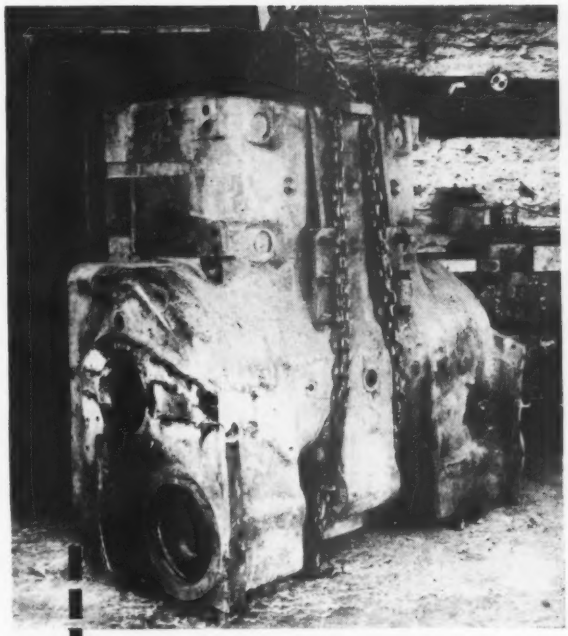
Complete specifications for Roylyn's 1900 Series tube unions are contained in this four-page brochure, along with illustrations of the collars, nuts, and rings involved. Table 1 gives estimated weight in pounds for the unions, while Table 2 reflects standard practices employed in commercial and Air Force specifications for flared tube fittings which are to be used with the 1900 Series. Information is also included on flaring, tube bending, wrench torques, and pressure. (Folder R191) *Roylyn, Inc.*

. . . for your copy circle No. 164


AN EXAMPLE OF

Low Temperature EUTECTIC WELDING ALLOYS

AT WORK!



SIMPLE WELD GIVES GIANT CASTING NEW LEASE ON LIFE

This giant iron casting, a 2900 pound transmission case, developed a serious crack and was sent to an independent welding shop – The Superweld Co. of Brooklyn, N. Y. – for repair.

Mr. V. F. Reina, Superweld's general manager, in describing the successful repair, said, "We chose EutecRod® 18FC for this difficult job. Unlike conventional welding materials, only slight pre-heating of this tremendous casting was required. Thus we avoided any stress, warping or embrittlement of the base metal. EutecRod® 18FC gave us a perfect joint. It required very little machining, and, it had the tensile strength to put that transmission case back into rugged operation."

These comments from an independent job welding shop are typical. Tough, even "impossible" repairs are being made every day with Eutectic "Low Temperature Welding Alloys"®. . . over 160 rods and electrodes to choose from.

Why not have your Eutectic District Engineer give you a free demonstration, right in your own shop, on your materials. More money-saving facts are yours in Eutectic's interesting new Weldor Magazine. Write today for your free copy.

® REGISTERED TRADEMARKS

EUTECTIC WELDING ALLOYS CORP.
40-40 172nd Street
Flushing 58, New York, N. Y.

*. . . for more details, circle No. 41 on Reader Service Postcard*

- PRODUCTION
- ASSEMBLY
- PACKAGING
- INSPECTION

LOW COST

**Hundreds of USES . . .**
**ADAPTABLE to practically ALL conditions!**

BELTS: 2" to 18" wide; White Cotton or Stitched Canvas; Rubber or Neoprene; Plastic or Wire Mesh.

Variable Belt Speeds — Adjustable Stands — Side Rails — 10' sections up to 80' — Steel, Aluminum or Stainless Steel.

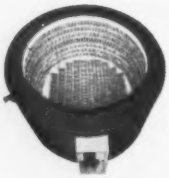
*Investigate TODAY — Send for Catalog*

**NEW LONDON ENGINEERING CO.**

DEPT. W, NEW LONDON, WISCONSIN

*. . . for more details, circle No. 42 on Reader Service Postcard*

**TRENT "Folded-and-Formed" HEATING UNIT**
**. . . for High Temperature Application where "Sheath-Type" Heaters Fail!**



The only packaged "non-sheath" type electrical heating element competing directly with fuel fired equipment for temperatures up to 2000° F. . . . Trent "Folded-and-Formed" Heaters now offer advantages not possible with any other type electrical heating unit!

**ADVANTAGES**—Compact, Space Saving Design • Longer Element Life • Maximum Radiating Surface Area • High Watt Density • High Temperature Uniformity to 2000°F. • Low Thermal Inertia • High Dielectric Strength (600V) • Pin Point Control • All-welded Connections • Unity Power Factor • Direct Fired Element • Eliminates Heat Exchangers, Pipe Networks, etc. • Uniformity Equivalent to Liquid or Vapor Jackets • Economical Installation and Maintenance

**APPLICATIONS**—Kettles • Air and Duct Heating • Furnaces • Ovens • Reactors • Jackets and Autoclaves • Pipe Lines

Before you design or install high temperature heated equipment, discuss your requirements with a Trent heating engineer. He'll show you how the outstanding features of Trent "Folded-and-Formed" Heating Units can mean greater efficiency and higher production for your application. Write for complete literature on Trent Kettles, Jackets, Ovens, Furnaces and Heating Elements.

**Trent Representatives in Principal Cities Coast to Coast**

TRENT INC.
Electrically Heated Industrial Equipment
242 LEVERINGTON AVE., PHILA. 27, PA.

*. . . for more details, circle No. 43 on Reader Service Postcard*


### 32-page guide to cast and forged steel valves

Over 165 valves are described and illustrated in this 32-page condensed catalog, including globe and angle stop, non-return, check, gate, hydraulic, relief, mudline, blow-off, and instrument valves. Design details are included, along with dimension charts, pressure-temperature ratings, weights, and material specifications. Valves included are primarily used for steam generating stations, technological and process installations, industrial plants, institutions, and oil drilling rigs. Final section of the book is devoted to correlation of valve size and pressure drop. (Catalog 105) *Edward Valves, Inc.*

**. . . for your copy circle No. 165**

### 44-page handbook on steam traps

Illustrated with photographs, drawings, and charts, this handbook is divided into sections, including side inlet traps, bottom inlet traps, forged steel traps, compound, air, and air relief traps. Book also contains information on the inverted bucket principle, a capacity chart with instructions on how to use it, and over 10 pages on trap selection. Pipe sizing data and layouts, installation and maintenance facts, and repair part lists are included. (Catalog J) *Armstrong Machine Works*

**. . . for your copy circle No. 166**

### Data on Dart malleable iron unions

Complete description and a price list for the Dart malleable iron unions with ball joint bronze seats is included in this four-page brochure. Nine types of Dart unions are illustrated, while features are emphasized with a cut-away photograph. (Bulletin D-255) *Fairbanks Co.*

**. . . for your copy circle No. 167**

### Manual on quick, slow blow-off valves

This 22-page book covering quick and slow-opening straightway valves for boiler services also includes information on angle valves, Y valves, water column and fire protection valves, and blow-off units. Each section gives a general description and specifications for each unit, along with special features, construction materials, and dimensions. Illustrated with large pictures and diagrams. (Bulletin E125) *Everlasting Valve Co.*

**. . . for your copy circle No. 168**

### Three leaflets on globe and gate valves

Eleven gate valves are pictured and detailed in an eight-page pocket-sized leaflet, which also contains a discussion of Ohio Brass' Flexitite disc. (Leaflet 1323-V) Globe valves are the subject of a second leaflet, which pictures and discusses six different types and lists outstanding features. (Leaflet 1322-V) A third leaflet treats two globe valves designed specifically for use with LP-Gas, giving information on operation, construction, and packing. Illustrated with cut-away photographs. (Leaflet 1345-V) *Ohio Brass Co.*

**. . . for your copy circle No. 169**

### Chart book on hydraulic tube fittings

A 20-page book contains charts and illustrations of hydraulic tube fittings for straight thread boss mounting, including both the Triple-Lok and Ferulok types. The book opens with a list of tube fitting features and order data; the balance gives information on 25 fittings. Final page lists other Parker literature available. (Catalog 4301) *Tube & Hose Fittings Div., Parker Appliance Co.*

**. . . for your copy circle No. 170**

### Data on complete A.W.W.A. valve line

Cross section and cut away views in this booklet illustrate construction and operation of Kennedy Valve's complete line of A.W.W.A. valves. Also included is detailed information on O-ring construction and a list of complete size ranges with dimensions in tabular form. Types of valves covered include bell end and flanged end non-rising stem gate valves, and outside screw and yoke gate valves. (Bulletin 561) *Kennedy Valve Manufacturing Co.*

**. . . for your copy circle No. 171**

### Guidebook for Welbond high pressure valves

Yarnall-Waring's Welbond valves for high-pressure and temperature use are detailed in a 12-page booklet which opens with cut-away drawings of the valve and a discussion of its construction and characteristics. Two pages of pictures show typical installations of the valve, while the final sections are devoted to valves for 1,500- and 2,500-psi. use, shut-off valves, installations on water gages, and blow-off valves. (Bulletin B451) *Yarnall-Waring Co.*

**. . . for your copy circle No. 172**

### Data on acid-resistant fittings

This 24-page handbook devotes seven pages to illustrations and size charts for pipe and fittings made from silicon iron alloy. Physical characteristics and advantages of the alloy are discussed in the book's opening section, along with typical installations and applications of the pipe and fittings. (Book PF 4a) *Duriron Co., Inc.*

**. . . for your copy circle No. 173**

### Data books on PVC pipe fittings, flanges, valves

Pipe fittings and flanges in both normal and high-impact PVC are the subject of a 12-page booklet which lists 18 advantages of PVC for fittings, and pictures several applications. Detailed information and charts are given for threaded and socket-type fittings, and threaded and blind, and socket-type flanges. Charts on PVC chemical resistance, flow and pressure loss, and operating pressures are included. A four-page leaflet is devoted to the economic advantages of PVC corrosion-resistant plug valves for handling corrosive fluids. A list of plug valve features is included, along with dimensions and a cut-away drawing of the valve. *Tube Turns Plastics, Inc.*

**. . . for your copy circle No. 174**

### Engineering, technical data book on valves

A 16-page engineering data book contains charts on dimensions of flange facings, ring-joint facings, and stainless steel pipe; pressure-temperature ratings for stainless steel flanged fittings and valves; American Standard Taper Pipe Threads; pressure and temperature conversion factors; hardness conversion; metal casting factors, and finally a materials selection chart. A second 12-page book gives technical data on valves, including design features, operating mechanisms, and facts on valve selection and maintenance. (From Catalog 55) *Copper Alloy Corp.*

**. . . for your copy circle No. 175**

### 32-page book on general purpose valves

General purpose valves of the drop-forged steel gate, globe, and angle type are the subject of this book. Two pages are devoted to general valve features, each illustrated, while seven pages give dimensions and specifications for gate valves, ten for globe valves, and five for angle valves. The final section contains pressure-temperature ratings for all 800-lb. general purpose valves. (Supplement 1, Catalog F-9) *Henry Vogt Machine Co.*

**. . . for your copy circle No. 176**

### Nylon plastic fittings for metal, plastic tubing

Two-piece nylon plastic fittings, molded from Du Pont Zytel Polyamide resin, for use with either metal or plastic tubing are described in five leaflets. Detailed drawings, tables of available sizes and prices, and descriptions of mechanical, thermal, and chemical properties are included. (Series 1100) *Thomas Associates*

**. . . for your copy circle No. 177**

### Complete line of cast iron gate valves

This four-page booklet gives information on the 29 valves in Ohio Injector's 125-lb. iron body gate valve line. Design features are pointed out in two cut-away illustrations, while a trim chart shows trim variations available on the valves for standard services as well as for use with corrosive acids and alkalies. A size chart is also included (Booklet 1005). A wallet-size condensed valve comparison chart compares OIC valves with those of eight other manufacturers. *Ohio Injector Co.*

**. . . for your copy circle No. 178**

### Data on pressure, flow, and liquid controls

Pressure, flow, and liquid level controls for use with steam, water, air, oil, and gas are explained in this four-page data sheet, which covers diaphragm motor valves, liquid level controllers, strainers, stop and check valves, pressure reducing valves, pump governors, pressure pilots, feed water regulators, traps, back pressure valves, and boiler water feeders. Pictures of each control are included as well as uses, materials from which the controls are made, and sizes. (Bulletin C-50) *McAlear Manufacturing Co.*

**. . . for your copy circle No. 179**

### 16-page data book on tube fittings

Hi-Duty tube fittings, in brass or aluminum, for use with seamless metal tubing is the subject of a 16-page two-color booklet which contains charts on comparative vibration test results, working pressures, and dimensions. Fittings detailed include nuts, connectors, female couplings, elbows, ball checks, and tees. All individual fittings are illustrated, while a picture spread shows several applications. (Bulletin 3002-A) *Imperial Brass Manufacturing Co.*

**. . . for your copy circle No. 180**

### Data books on stainless and alloy steel fittings

Forged stainless and alloy steel fittings for process liquid and gas piping and high temperature steam lines are treated in an eight-page booklet, which covers both screw-end and socket-weld types. Alloys treated include three types of stainless steel, two types of chromium-molybdenum steel and 4-6 chrome ½% moly fittings. Specifications, dimensions, and weights are treated in chart form. (Bulletin S-1-55) A second four-page booklet is devoted to 150-lb. stainless steel pipe fittings of the screw-end and socket-welding type, and contains illustrations and dimensions charts for both. (Bulletin S-3-55) *Watson-Stillman Fittings Div., H. K. Porter Co., Inc.*

**. . . for your copy circle No. 181**

Portable Model DC-2000 cuts circles to 19½" diameter, rectangles to 12"x35", and metals to 8" thick. Torch accommodates all Victor 1-101 and 1-100 cutting tips, through size 5.

***Flame cuts parts accurately, saves handling and set-up time, increases labor efficiency.***

This portable VICTOR DUPLICUTTER weighs only 36 pounds. Operator easily carries it to any work location in plant, field or warehouse . . . thus saving you time and cost of moving materials. Set-up takes minutes only. You lose no time leveling DUPLICUTTER—its magnetized feet use stock being cut as working base. And it's so simple one man easily handles production from 2 or 3 DUPLICUTTERS.

Precise controls and powerful, permanent magnet in template follower enable you to duplicate parts to production tolerances of plus or minus 1/64". Easy, quick interchange of templates makes DUPLICUTTER practical for both long production runs or duplication of single part.

Why not see for yourself how easily the VICTOR DUPLICUTTER handles, how fast and accurately it cuts? Call your VICTOR dealer NOW and ask him for a demonstration on your job . . . or write us for descriptive Bulletin 353.

VICTOR for welding

*For maximum efficiency and safety, use genuine Victor tips and parts*

30

**VICTOR EQUIPMENT COMPANY**

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines.

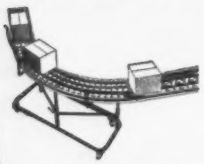
844 Folsom St.
San Francisco 7

3821 Santa Fe Avenue
Los Angeles 58

*. . . for more details, circle No. 44 on Reader Service Postcard*

# Rapistan®

## MATERIALS HANDLING EQUIPMENT

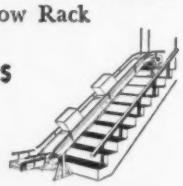


**GRAVITY CONVEYORS**

- Wheel & Roller
- Aluminum & Steel
- Flow Rack

**POWER CONVEYORS**

- Permanent Belt
- Portable Belt
- Overhead Chain



**INDUSTRIAL CASTERS & WHEELS**
Cold-forged & Steel-forged

**LOCAL WEST COAST STOCKS**

LOS ANGELES E. A. Stevenson Co., Trinity 6905
820 Santa Fe Ave., Los Angeles, California

SAN FRANCISCO Rapistan of California, Inc.,
Yukon 2-3880, 444 Brannan St., San Francisco 7, Calif.

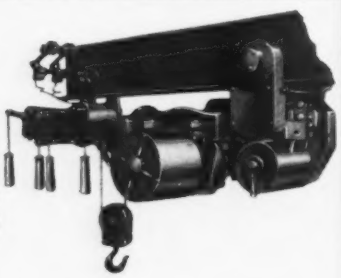
SEATTLE Air-Mac, Inc. of Washington, MU 3388,
3838 4th Ave., S., Seattle 4, Washington

PORTLAND Air-Mac, Inc. of Oregon, Elmore 6524,
1435 S.E. Union Ave., Portland 14, Oregon

*. . . for more details, circle No. 45 on Reader Service Postcard*

# ELECTROLIFT

## WORM DRIVE HOISTS



***keep materials on the move***

ElectroLift Worm Drive Hoists are designed for year-after-year operation with top performance and efficiency. Their design and construction assure safe, quiet, speedy action for uninterrupted flow of materials. ElectroLift offers a selection of hoisting speeds, height of lifts and controls in capacities up to 10 tons. Consult your ElectroLift representative listed in the telephone directory.

3792

ELECTROLIFT

**ELECTROLIFT, INC., 204 Sargeant Ave., Clifton, N. J.**
*. . . for more details, circle No. 46 on Reader Service Postcard*


### Information on cast steel valves, fittings

The first half of this booklet is devoted to cast steel valves of the gate, globe, angle, swing check, globe check, and angle check types, giving dimensions and prices for each of the valves listed in all pressure ratings. Second half of the booklet treats cast steel fittings in straight and reducing sizes. Forged steel flanges and welding fittings are covered briefly. *Durable Valve & Manufacturing Co.* . . . for your copy circle No. 182

### Snap-Tite leaflets on high-flow couplings

Everything you want to know about Snap-Tite couplings is contained in these eight illustrated leaflets which treat many different kinds of couplings and include engineering data, size charts, construction information, and complete lists of spare parts. Cut-away photographs and drawings illustrate design features. *Snap-Tite, Inc.* . . . for your copy circle No. 183

### Loose-leaf book on butterfly valves

This 24-page book on R-S butterfly valves gives a complete description of many valves in Morgan Smith's 15- to 300-lb. range, with specifications, layout drawings, and dimensions of standard valves in each pressure rating. Catalog contains sections on special metals and modifications available for extreme operating conditions, data on standard valve operators and positioners. *S. Morgan Smith Co.* . . . for your copy circle No. 184

### Three booklets on ball valves and unions

A six-page three-color booklet gives information on Rockwood's round flow ball-type valve and illustrates its operation with several drawings. Specifications are included, along with four case histories of the valve's use. (V folder) Rockwood's Top Entry ball valve is the subject of a second four-page leaflet, which points out features of the valve through use of photographs. Specifications are included. (Booklet B.V.) A third four-page booklet gives specifications for six cold forged steel unions. *Rockwood Sprinkler Co.* . . . for your copy circle No. 185

### Lunkenheimer bronze globe valves

Folder gives information on Lunkenheimer's bronze globe valve with 200-lb. S.P. rating for high-pressure service. Cut-away shows construction features of the valve, and a dimension chart is provided for valves of ¼ through 2 in. (Circular 605) *Lunkenheimer Co.* . . . for your copy circle No. 186

### Leaflet on straightway diaphragm valves

This four-page picture leaflet treats the Grinnell-Saunders diaphragm valve with "straight-through" flow for handling viscous materials, fibrous slurries, sludges, pulp stock, latex, magmas, semi-fluid foods, solids in suspension, etc. Design features are illustrated with a cut-away drawing, while three different types of valves are shown. A chart is included with dimensions, while two diagrams illustrate frictional resistance to flow of water. *Grinnell Co., Inc.* . . . for your copy circle No. 187

### Picture pamphlet on scale free welding couplings

A four-page picture pamphlet explains and illustrates how to use scale free welding couplings, explaining what they are, how they work. A list of suggested applications is included along with a specification chart. *Tube Turns Div., National Cylinder Gas Co.* . . . for your copy circle No. 188

### Engineering data on polyethylene tubing, fittings

A four-page leaflet gives a complete listing of Poly-Flo fittings and their sizes, accompanied with dimension drawings. Information on disconnect valves is included. Final page of the booklet is devoted to specifications. (Bulletin 3025-C) *Imperial Brass Manufacturing Co.* . . . for your copy circle No. 189

### Illustrated book on steam plant equipment

Blow-off valves, water columns and gages, liquid level indicators and recorders, expansion joints, steam traps, strainers, and spray nozzles are all treated in this 12-page book on steam plant equipment for utilities, industrial plants, and institutions. Each piece of equipment is illustrated and described in detail. A final short section of the book explains Yarnall-Waring's research and manufacturing facilities. (Bulletin G-1308) *Yarnall-Waring Co.* . . . for your copy circle No. 190

### Information book on general purpose valves

Fourteen different valves for general services are pictured and described in this 16-page booklet. In addition to dimensions, weights and price lists are included. Covered are the straight lever, and rack and pinion types, some inside packed, others with outside stuffing box. A final section covers steam jacketed valves. (Bulletin E160) *Everlasting Valve Co.* . . . for your copy circle No. 191

### 84 pages on steel and bronze valves

These three books contain complete information on steel valves to meet most all industrial requirements. A 12-page booklet, treating general purpose steel gate valves for process and power piping systems, explains four valves with screwed and socket weld ends, two for standard and two for high flow. (Bulletin 202C) A second 48-page book is devoted entirely to steel valves for industrial plant services and includes globe, angle, straightway, and water column shut-off valves. (Bulletin 230) A third 24-page booklet treats bronze and steel Flocontrol valves, giving information on globe and angle valves of bronze, cast steel, steel, and including capacity tables and flow charts. (Bulletin 280) *Manning, Maxwell & Moore, Inc.*

**. . . for your copy circle No. 192**

### Three books on gate and diaphragm valves

A six-page brochure details Crane's line of 600-lb. small steel gate valves with both the union bonnet and bolted bonnet. Dimensions and prices are included for each valve discussed, as are illustrations and working pressure charts. (Bulletin AD1881) A second four-page booklet discusses non-rising stem brass gate valves in the 100-, 125-, and 150- lb. class. Three valves are covered, with an enlarged cut-away illustration showing valve features. (Bulletin AD1944) A 24-page booklet includes Crane's line of packless diaphragm valves, detailing valve patterns, body material, trim materials, linings, and operators. Six pages are devoted to charts with suggested applications for the valves. (AD1942) *Crane Co.*

**. . . for your copy circle No. 193**

### How to install locking inserts

A four-page leaflet contains installation data for WEG locking inserts with illustrations showing the three basic steps—drill and tap, or bore, install, lock. A chart of installation dimensions is included for metals and plastic, and a second chart for wood. Leaflet also contains size charts for both the fine and coarse thread series of inserts. (Folder R-220) *Roylyn, Inc.*

**. . . for your copy circle No. 194**

### Corrosion-resistant valve construction

Photographs, charts, and diagrams explain the construction of the corrosion resistant Durco Type F valve, which consists of an alloy body and plug separated by a Teflon sleeve. Information is also included on the firm's three-way, flanged, and sampling valves. (Bulletin V4a) *Duriron Co., Inc.*

**. . . for your copy circle No. 195**

### Fairbanks bronze globe, gate valves

Bronze globe valves with stainless steel plug discs and seats are detailed in a four-page leaflet, which describes the two-piece union bonnet construction and radial seating features. Three globe valves with 150-, 200-, and 300-lb. S.P. ratings are discussed, along with two angle valves of 200- and 300-lb. S.P. ratings. (Bulletin V-525) A four-page booklet gives general specifications of the standard bronze gate valves, including solder and brazed end valves. Construction features are illustrated with the 300-lb. union bonnet gate valve. (Bulletin V-260) Another four-page brochure is devoted to renewable seat ring bronze gate valves, illustrating the replacement of the nickel alloy seat rings while valve body remains installed in the line. Dimension chart is included. (Bulletin V-123) *Fairbanks Co.*

**. . . for your copy circle No. 196**

### Data on Y-type pipe strainers

Design features, dimensions, and prices of eight sizes of cast semi-steel Y-type pipe strainers for pressures to 250 lb. are covered, along with data on six sizes of carbon moly steel strainers for pressures to 900 lb. and temperatures to 900 deg. F. Illustrated with photographs and drawings. (Bulletin 602) *Armstrong Machine Works*

**. . . for your copy circle No. 197**

### 76-page handbook on control valves

The five sections of this control valve handbook cover construction, standard control valves, special control valves, auxiliary equipment, and technical data. Section 1 on construction discusses and pictures diaphragm motors, valve bodies, valve trim, plug stem-motor stem connections, and includes information on materials and packing. Section 2 on standard control valves is composed of charts and cut-away illustrations of high-pressure, small-flow, three-way, and several other types of valves, while Section 3 treats butterfly, pressure-balanced, special high pressure angle, springless motor and electric gear valves. The auxiliary equipment section contains data on handwheels, positioners, volume boosters, loading valves, reversing relays, instrument supply valves, lock-up valves, limit stops, and solenoid valves. Technical data includes Cv-flow coefficient information, flow characteristics, rangeability, valve sizing, capacity and pressure-drop limitations. (Catalog 305) *Mason-Neilan Regulator Co.*

**. . . for your copy circle No. 198**

**Does your company get FIRST CALL?**

When people know nothing about the relative merits of two suppliers listed in the Yellow Pages, they are apt to judge them by what they say about themselves in their advertisements.

Does your company give all the facts about itself, its products, its services, its dealers? You know how important these things are to you when you look in the Yellow Pages. Your potential customers think them just as important.

**Help people find YOU fast in the YELLOW PAGES**

Pacific Telephone

*. . . for more details, circle No. 47 on Reader Service Postcard*

# HELPFUL LITERATURE for the West's plant operating executives

**FOR YOUR FREE COPIES, cirle appropriate key numbers on postcard, page 67**

### 102-page manual on alloy and stainless steels

Complete application and specification data has been listed for Electric Steel Foundry Co.'s line of alloys and stainless steels for the process and manufacturing industries. Particularly helpful in the selection of the right material to do a given job are the tables of corrosion resistant qualities of each item, composition by percentages, and representative mechanical properties at room temperature. A well illustrated section of plant facilities at ESCO is included as well as a pictorial and specification presentation of products such as strainers, fittings, piping, valves, etc. (Catalog 175-A) *Electric Steel Foundry Co.*

**. . . for your copy circle No. 200**

### 160-page G. E. manual on electrical equipment

This handbook of low voltage electrical distribution equipment and components is designed to provide engineeers, contractors, and purchasing agents with information for specifying equipment and components for applications up to 600 v. The 1956-57 bound reference book contains photographs, descriptions, ratings, list prices, and application information on lighting and distribution panelboards, wireways and busways, switchboards, motor control centers, distribution center unit substations, safety switches, open knife switches, molded case circuit breakers, and service entrance equipment. (Catalog GEC1032A) *Trunbull Components Dept., General Electric Co.*

**. . . for your copy circle No. 201**

### Booklet on 200 tools with throw-away inserts

More than 200 tools are detailed in 17 holder styles, 11 negative rake and the balance positive rake, in this 12-page booklet on tooling with button-type throw-away inserts. Square, round, triangular-turnover type and heavy duty inserts are discussed and illustrated. (Folder B-301) *Kennametal, Inc.*

**. . . for your copy circle No. 202**

### 40-page data book on air handling units

Designed as a reference guide for architects, engineers, and air conditioning contractors, this engineering manual contains complete data on both ceiling-suspended and floor-mounted air handling units for commercial, industrial, and residential heating and cooling. Manual gives illustrations, dimensions, capacities of the equipment, and includes charts and tables. Subjects covered are selection of proper unit sizes, fan outlet velocities, dry air friction, mean temperature difference, etc. (Manual EM-G5622) *Drayer-Hamson, Inc.*

**. . . for your copy circle No. 203**

### 16 pages of information on silver brazing preforms

"The Path to Better Brazing" is a 16-page book on silver alloy preforms. The book opens with a chart of 31 silver brazing alloys and their features, and includes a section on preform versus hand feeding. Preforms detailed include rings and washers of several different types. Two pages discuss fluxes, while the final section is devoted to methods of application. A ring weight calculating chart is included. *Lucas Milhaupt Engineering Co.*

**. . . for your copy circle No. 204**

### Customer service book on complete Garrett line

"A Desk Guide to Garrett" is a four-page booklet covering the entire Garrett line. It illustrates with pictures and describes the services which Garrett offers in the field of industrial supplies for tooling and production. Book is regular file size. *Garrett Supply Div., Garrett Corp.*

**. . . for your copy circle No. 205**

### Information on chemical resistant plastic pipe

Data on Ryerson's PVC rigid type unplasticized pipe which will resist attack by industrial chemicals is given in this eight-page booklet. Publication details other advantages of the pipe, gives information on size, weight, and cost. A section is also devoted to PVC valves and fittings. (Bulletin 80-3) *Joseph T. Ryerson & Son, Inc.*

**. . . for your copy circle No. 206**

### 168-page hard-cover book on ball bearings

This basic data book is designed to aid selection and specification of ball bearings and ball bearing power transmission units for specific applications. Complete engineering data is presented in the sequence normally followed in the selection of types and sizes of bearings and transmission units. Book contains dimensions, tolerances, and capacities; an explanation of the Fafnir numbering system precedes both the section on radial bearings and that on wide inner ring bearings. Complete with tables and tab-indexed for easy reference. (Catalog 56) *Fafnir Bearing Co.*

**. . . for your copy circle No. 207**


**IRA G. PERIN CO.**

**Material Handling Equipment**

LOCAL STOCK & PARTS

SAN FRANCISCO 5
575 Howard Street
Phone GArfield 1-1827

SERVICE • • • SURVEYS

*. . . for more details, circle No. 48 on Reader Service Postcard*

*Keeping up with the ever-changing toy market calls for lots of production ingenuity. Mattel, Inc., the West's largest toymaker, has a flair for developing "impossible" production shortcuts. The first steps in producing a new line of toys takes place in the tool room (main picture). Here Mattel craftsmen fashion press tools for items like the toy cap "Burp Gun" . . . one of the company's biggest sellers. The gun's housing and all working parts are fabricated from USS Drawing Quality sheets.*


*Fast, accurate metallurgical advice*

## Helps production run smoothly and on-time

Because they're located two and three thousand miles from their major markets, Mattel, Inc., of Los Angeles, must depend on originality, quality and production speed to offset the geographical handicap. In their constant race with the calendar, Mattel acts to avoid time-consuming production delays by careful selection of the right steel for each new line of toys . . . and doing this well ahead of time.

Here's where USS Metallurgists help. Fast, accurate advice from this source has been a vital factor in Mattel's production efficiency. To be sure you're using the one right steel . . . add a USS Metallurgist to your production team. This is an easy, cost-free way to increase your production efficiency by avoiding production problems *before they happen.*

***Free!*** WI-5

UNITED STATES STEEL CORPORATION
COLUMBIA-GENEVA STEEL DIVISION
120 MONTGOMERY STREET
SAN FRANCISCO 6, CALIFORNIA

Please send me your free wall chart showing weights, standard sizes and gauges of Steel Sheets.

*Name*_____

*Address*_____

*City*_____ *State*_____

*USS Steel Sheets*

USS

UNITED STATES STEEL

*. . . for more details, circle No. 49 on Reader Service Postcard*

**Kingwell**

101 YEARS OF PROGRESS

1855 1956

KINGWELL BROS., LTD.
457 Minna St., San Francisco, California
2618 E. 53rd St., Huntington Park, California
Distributors in principal western cities

*. . . for more details, circle No. 50*


## Description of control, identification systems

"Six Honest Serving Men" is a 20-page brochure explaining equipment for automated data processing on selfwriting metal identification tags and its applications for linking office-factory systems to control production, storage, inventory, shipping, and receiving. Illustrated with photographs and system flow charts, the three-color booklet describes the Databosser, Dashaplates, and other writing and marking tools for implementing identification and control systems. Charts illustrate applications of the equipment for control of material input, in process of remanufacturing, and production of assembled products. *Dashew Business Machines, Inc.*

**. . . for your copy circle No. 208**

## Eight adhesives for industrial bonding

Eight Epibond Epoxy adhesives for application in metal, plastic, and ceramic bonding are detailed in chart form in this six-page leaflet. Listed by identifying number, the adhesives are compared on the basis of hardener, typical pot life, cure, and tensile lap shear. (Leaflet EP 56-94) *Furane Plastics, Inc.*

**. . . for your copy circle No. 209**

## Single, double, triple-reduction gearmotors

"Reduce Speed" is an eight-page two-color booklet describing the new line of Reliance gearmotors incorporating new NEMA standards, with completely redesigned gearheads. First section of the booklet presents the various types of motors, mountings, enclosures, and ratios available. It is followed with a detailed cutaway view of a gearmotor. Other sections cover maintenance and selection data. (Bulletin E-2408) *Reliance Electric & Engineering Co.*

**. . . for your copy circle No. 210**

## How-to-do-it book on paint stripping

Paint removal by the application of alkaline or solvent materials is the subject of Oakite's revised booklet, "How to Strip Paint." Booklet describes the procedures followed in four different stripping methods—steam gun, hot flow-in, cold spray, and tank. It tells which materials should be used for specific types of paint, enamel, and lacquer, and discusses ways to protect stripped parts from rust in storage and how to prepare them for repainting to prevent future rusting. (Bulletin F 7893C-4) *Oakite Products, Inc.*

**. . . for your copy circle No. 211**


# Ask Standard *how*



Order-picking is expedited and simplified by this Standard system of roller and belt conveyors in large warehouse.

## belt and roller conveyors ease warehouse traffic jams

FAST flow of goods and simplified labor add up to more profitable warehouse operations.

Standard offers a wide variety of gravity and powered, permanent and portable conveyors that can help you establish smooth, more profitable warehousing.

Spend a few moments with a Standard engineer. He'll show you how inexpensive Standard conveyors give you maximum flexibility at minimum cost. He'll show you, too, how Standard conveyors provide the many advantages of a custom-designed system at low cost. STANDARD CONVEYOR COMPANY, General Offices: North St. Paul 9, Minn. *Sales and Service in Principal Cities*

*Write for Bulletin. 309-WI-5 Better still, contact the Standard engineer listed in your classified phone book.*

SEATTLE: Russel G. Daley, 502 First Ave. S.
PORTLAND: 1115 N.W. Glisan St.
SAN FRANCISCO: 840 Harrison St.
LOS ANGELES: 115 E. 23rd St.

*. . . for more details, circle No. 51 on Reader Service Postcard*

### Protective coatings for rust prevention

This 28-page handbook on rust prevention contains 102 color chips showing colors available in primers, short oil type coatings, oil field finishes, restful color group finishes, machinery and implement colors, long oil type coatings, floor and deck coatings, and many other types. A section is devoted to showing the coating's penetration through rust to bare metal as measured by radioactive tracer techniques, while a second section discusses Galvinoleum coatings, specially formulated to be applied over galvanized, aluminum, and Terne Plate surfaces without etching or excessive weathering. Catalog is illustrated in four-color and concludes with a question-answer section about the rust preventive coatings. *Rust-Oleum Corp.*

. . . for your copy circle No. 212

### Data sheet on pre-set automatic counters

Features of the Cyclo-Monitor, a circuit controlling pre-set counter with automatic reset, are outlined in a four-page leaflet which lists about 35 applications for the units. Pictures of the unit and also drawings are included, along with a full page of general characteristics including construction, control range, setting, speed, and switching interval. (Bulletin 202-1) *Counter & Control Corp.*

. . . for your copy circle No. 213

### Data on complete line of brass, aluminum nuts

This 16-page, two-color catalog covers the complete Fischer line of turned brass and aluminum nuts, giving specifications for standard hexagon nuts, open and closed-end nuts, and knurled thumb nuts, as well as the firm's lighting fixture, spark plug, and battery nuts. A section of the booklet is devoted to Fischer's technical assistance department facilities, a source of help for fastening problems. *Fischer Special Manufacturing Co.*

. . . for your copy circle No. 214

### Illustrated catalog on Bethlehem switch stands

"Bethlehem Switch Stands" is a new catalog devoted to the numerous types and sizes of switch stands made by Bethlehem for standard and narrow-gage service. Each model is described and illustrated. *Bethlehem Pacific Coast Steel Corp.*

. . . for your copy circle No. 215


STOP...

**Metal cleaning can be Automated, too!**

Don't pyramid your production costs by using hand-operated metal cleaning methods. Detrex cleaning equipment can be built right into your automated line, thus eliminating slow and costly manual labor. In fact, Detrex has been building automated degreasers and washers for years.

Keep your metal cleaning processes in step with the rest of your production. Rely on Detrex quality and experience to maintain the pace. Mail the coupon for complete information on Detrex equipment or check your Sweet's Plant Engineering File.

☐ I am interested in automating my ____degreasing ____washing operation.

☐ Please send literature on standard Detrex equipment.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

DETREX CORPORATION DEPT. A-223

3027 Fruitland Ave., Los Angeles 58, Calif.

DEGREASERS • DEGREASING SOLVENTS • WASHERS • ALKALI AND EMULSION CLEANERS • PHOSPHATE COATING PROCESSES

*. . . for more details, circle No. 52 on Reader Service Postcard*

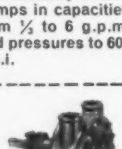
ROTARY PUMP REPLACEMENT SERVICE

# TUTHILL

## Pumps for Maintenance in Lubrication, Coolant, Hydraulic and Liquid Transfer Service

**MODEL L**
Mechanically-sealed pumps in capacities from ⅓ to 6 g.p.m. and pressures to 600 p.s.i.

**MODEL C**
General purpose pumps in capacities from 2 to 200 g.p.m. and pressures to 100 p.s.i.



**MODEL CK**
High pressure pumps in capacities from 5 to 200 g.p.m. and pressures to 400 p.s.i.

**MODEL M**
Coolant pumps with automatic internal by-pass. Capacities from 2 to 50 g.p.m. and pressures to 15 p.s.i.

**MODEL R**
Automatic reversing pumps in capacities from ¾ to 200 g.p.m. and pressures to 100 p.s.i.

For prompt attention on your positive displacement, internal-gear rotary pump replacement needs, you can depend on our West Coast representatives for service at all times out of local stocks.

**Write, wire or phone them today for quick action.**

**TUTHILL PUMP COMPANY**
Dependable Rotary Pumps . . . since 1927
939 East 95th St., Chicago 19, Illinois

***Sales Representatives:***

Westco Pump Sales Company, 85 Industrial Street San Francisco 24, California, VAlencia 6-5104
Wagner Hydraulic Company, 10633 Wellworth Avenue Los Angeles 24, Calif., ARizona 8-5332 and Bradshaw 2-2091
Hallidie Machinery Company, Inc. 210 Hudson St., Seattle . . . LAnder 9520
North 2518 Division, Spokane . . . EMpire 7131
1545 South East Union, Portland . . . BEImont 4-7491
Equipment Specialties Co., 120 South Broadway, Denver 9, Colorado . . . SHerman 4-2738

*. . . for more details, circle No. 53*


## 24 pages of data on motor control center

A general purpose motor control center is the subject of this 24-page two-color booklet from G.E. Publication describes construction and applications for the control center, also listing ratings, weights, dimensions, installation data and guide form specifications. The control center, Type DA7093, is designed to accommodate starter units of either the fusible or circuit-breaker type in NEMA sizes 1 through 5. (Bulletin GEA-6367) *General Electric Co.*

**. . . for your copy circle No. 216**

## Picture book of facts on welding processes

Purchasing agents, shop foremen, and welders will find information in "Picture Book of Facts on Eutectic's Welding Processes" on the low heat input metal joining process. Technical data concerns the low-temp Eutecrods and low amp Eutectrodes, while the importance of fluxes is thoroughly discussed. Several pages are devoted to case histories of metal joining and a chart shows applications by base metals for more than 160 low temperature welding alloys. (TIS 2367) *Eutectic Welding Alloys Corp.*

**. . . for your copy circle No. 217**

"IT'S A LONG STORY, BUT I'LL NEVER ORDER ANYWHERE BUT FROM INDUSTRIAL WIRE."

- Wire Cloth and Screen
- Wire Products
- Wire straightened and cut
- Wire of all types

**Immediate delivery**

**INDUSTRIAL Wire PRODUCTS CORPORATION**
5649 Alhambra Avenue, CA 2-7131
Los Angeles 32, California

*. . . for more details, circle No. 54*


## 134-page book on brazing aluminum

Practical shop data and current developments in the art of brazing aluminum are presented in the 134-page book, "Brazing Alcoa Aluminum." A brief general history of brazing and an explanation of the action that occurs between filler and parent metal and flux during the brazing process introduce the subject. Brazing materials and considerations involved in designing, preparing, and assembling brazed joints are treated in full. The illustrated book contains chapters on specialized processes also, including brazing castings, brazing aluminum to other metals, performance of brazed joints, cleaning and finishing, and inspection and testing. A tabular section is included, with information listed by alloy number. For your copy write on business letterhead directly to *Aluminum Co. of America, Dept. WI, 774 Alcoa Building, Pittsburgh 19, Pa.*

**. . . for your copy circle No. 218**

## 32-page data book on distribution transformers

This book gives design and product data on single and three-phase distribution transformers with high-voltage ratings from 480 to 15,000 v. Thirty-eight data tables are given for single-phase transformers with high voltage ratings, while three-phase transformer data is supplied in 22 tables. Tables give kva. ratings, physical dimensions, weights, losses, efficiencies at full and partial load, and per cent regulation for 1.0 and .8 power factor. (Bulletin 3-500) *Gardner Transformer Div., Federal Pacific Electric Co.*

**. . . for your copy circle No. 219**


**MILLER-ROBINSON CO.**

**HIGH FREQUENCY INDUCTION PROCESSING**

SILVER BRAZING
LOCALIZED HEAT TREATING

Production — Tooling
Engineering — Equipment

7007 Avalon Blvd., Los Angeles 3
PLeasant 2-6141

*. . . for more details, circle No. 55*

### Complete Automatic line of electric industrial trucks

A 16-page illustrated book includes information on the complete Automatic Transportation line of electrically driven industrial trucks, ranging in size and load capacity from the operator-led transporters to the large Skylift fork and ram trucks capable of lifting loads up to 100,000 lb. Among the equipment illustrated are platform and pallet trucks, both operator-led and rider types, tractors, cranes and special trucks. *Automatic Transportation Co.*

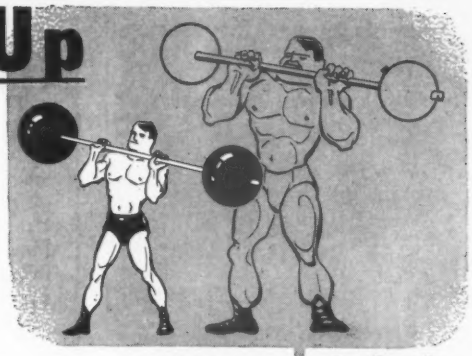
. . . for your copy circle No. 220

### Specification book for alloy space screens

A four-page illustrated booklet details Wissco-loy space screens and gives a complete listing of standard specifications as well as recommended applications and ordering data. Included is information on specially fabricated screens for specialized needs, the alloy from which the screens are made, special screen features, and services the firm offers in solving individual screening problems. *Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp.*

. . . for your copy circle No. 221

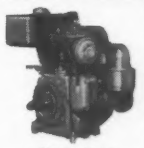

# Power-Up your equipment the "Beefless" way

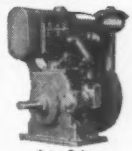


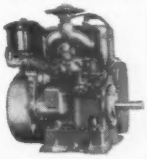
You don't need "beefy" bulk to get brawn . . . nor *size* to insure stamina. Built for the work you want them to do, *sized* to fit your equipment most readily, Wisconsin Heavy-Duty Air-Cooled Engines offer a variety of design and performance advantages.

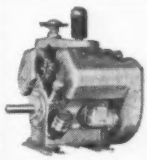
Every Wisconsin Engine (3 to 36 hp.) has the inbuilt "lug-ability" to slug it out in the roughest company . . . and in this performance, Wisconsin's advanced concept of heavy-duty engineering in a compact power package plays an important role in direct relation to the *design* and *operating* requirements of the original equipment builder.

**Bulletin S-188 brings you complete data. Write for it.**


3 to 6.8 hp.


6 to 9 hp.


7 to 15 hp.


15 to 36 hp.

**WISCONSIN MOTOR CORPORATION**

*World's Largest Builders of Heavy-Duty Air-Cooled Engines*

MILWAUKEE 46, WISCONSIN

A 8719-3/4A

*. . . for more details, circle No. 56 on Reader Service Postcard*

# Faster Service on DEPENDABLE Dick Power Transmission and Conveying Equipment

**3 CONVENIENT WEST COAST SERVICE CENTERS**

You'll get immediate attention and fast deliveries when you contact one of R. & J. Dick Company's three easily accessible West Coast offices and warehouses — at Los Angeles, San Francisco or Seattle.

Each center is stocked with the complete line of *dependable* Dick power transmission and conveying equipment . . . accepted by manufacturers who rely on the Dick line to help them avoid costly breakdowns and production delays. For information on how you can step up *your* plant's efficiency, call or write the office nearest you.

FACTORY SALES REPRESENTATIVES FOR *Atlas Roller Chain • Sewall Roller Chain Sprockets*

**BARRY STEEL SPLIT PULLEYS**

Scientifically designed. Electrically welded. Light weight. Easily installed. Maintain exact shape under all loads.

**DICK ROPE QD SHEAVES**

Heavy duty "quick-demountable." On or off shaft in minutes. No wobble or loss of balance. 802 stock sizes fit over 25,000 stock drive combinations from ½ to 600 hp. *Also* . . . stock V-Belt drives and "special" sheaves for every application.

**DICK'S BALATA BELTING**

Hard surface, closely woven duck, thoroughly impregnated with Balata Gum. Free from stretch and shrinkage. Moisture resistant. High transmission efficiency.

**BARRY CONVEYOR PULLEYS**

Light weight combined with super strength. Welded steel construction. Easily installed. Wide range of sizes for all general conveyor services.

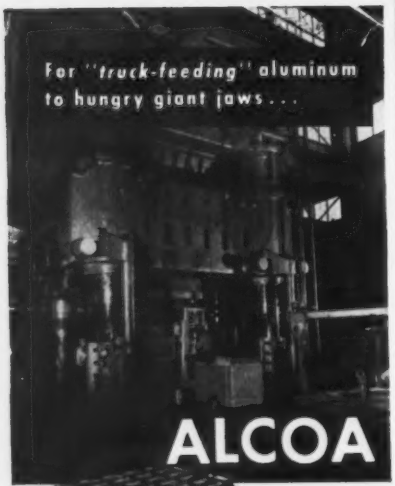
3 Convenient West Coast Service Centers

**R. & J. Dick COMPANY, INC.**

PASSAIC • NEW JERSEY

| MAYWOOD (Los Angeles) | SAN FRANCISCO 7 | SEATTLE 4 |
|---|---|---|
| 5276 Atlantic Blvd. | 510 Bryant St. | 307 Maritime Bldg. |
| LOgan 8-4014 | SUtter 1-1341 | MUtual 1922 |

*. . . for more details, circle No. 57 on Reader Service Postcard*



uses **C&D batteries**

It takes a lot of aluminum to keep this mammoth filled. And this is just one of many giant presses at Alcoa busy shaping the millions of Alcoa® Aluminum products used throughout America's armed forces, homes, and industry.

To help solve vital material handling problems, Aluminum Company of America uses C&D Slyver-Clad® batteries as a major source of power for the electric industrial trucks used in its daily operations.

C&D Slyver-Clad batteries are approved as standard equipment by all electrical truck manufacturers. For further information, write for Catalogs.

**C&D WEST COAST OFFICES**

Seattle—Industrial Products Co., 2911 First Avenue, S.
Portland—Pacific Battery Mfg. Co., 427 N.E. Cook St.
San Francisco—McCormick-Morgan, 725 Second St.
Los Angeles—F. H. Pelletier Co., 1014 Venice Blvd.
La Jolla, Calif.—Frank T. Butler, 722 Fern Glen
Denver—Howard Toncray, 1732 Blake St.

**C&D BATTERIES, INC.**
*of Conshohocken, Pa.*

INDUSTRIAL BATTERIES SINCE 1906

**SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST**

*... for more details, circle No. 58*


### 66-page guidebook on carbide cutting tools

This 66-page metalworking catalog covers the most effective cutting speeds for carbide tools, machine tool horsepower requirements, determining shank size of single-point tools, carbide tool geometries, carbide grade selection, and many other subjects. Sections are devoted to price and specification information on standard brazed carbide tools and tool holders, throw away inserts, blanks for twist drills, dies, bushing, guide rings, etc. Illustrated with photographs, diagrams, and charts. (Catalog GT-310) *General Electric Co.*

**... for your copy circle No. 222**

### Series of booklets on wringers, spinners, dryers

Here are booklets on several models of extractors for the textile industry, unloading extractors for food processing, continuous centrifugals, batch type centrifugals for process industries, the centrifugal galvanizer, the centrifugal metal dryer, and centrifugal chip wringer. Each booklet is well illustrated and contains complete data on the equipment. Pressure-leaf filters for liquid clarification and solids recovery are covered in a 20-page booklet, which includes pictures and illustrations. *American Machine & Metals, Inc.*

**... for your copy circle No. 223**

### Data on overhead crane conductor, collector system

Cleveland Crane's inverted-Y electrification, a complete conductor and collector system designed for overhead crane and runway electrification, is treated in an eight-page, two-color booklet. Drawings and information show and describe the conductors, supports, and collectors and how they work. (Catalog 2021-A) *Cleveland Crane & Engineering Co.*

**... for your copy circle No. 224**

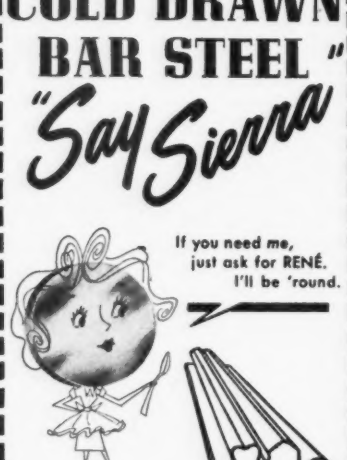
### Data on complete line of Belt power conveyors

This eight-page booklet gives complete information, including length, construction data, capacity, belt description, details on drive unit, bearings, switch controls, and stands, for the complete line of Belt Corp.'s power conveyors. Pictures and drawings of each model accompany the text. *Belt Corp.*

**... for your copy circle No. 225**


for quality and service on

**COLD DRAWN BAR STEEL "Say Sierra"**




**SIERRA DRAWN STEEL CORP.**

5821 E. Randolph St., Los Angeles 22
Phone RAymond 3-6431
... of the Northwest
6600 Airport Way, Seattle · Phone RAinier 5961
*Western Steel for Western Industry*

*... for more details, circle No. 59*

**MILFORD**

TUBULAR RIVETS
SPLIT RIVETS
COLD-FORMED SPECIALTIES
RIVET-SETTING MACHINES

MILFORD RIVET

**THE MILFORD RIVET & MACHINE CO.**
**PACIFIC DIVISION**

12937 IMPERIAL HIGHWAY, NORWALK, CALIFORNIA
PHONE: WHITTIER, CALIF., OXFORD 3-3777

OTHER PLANTS IN MILFORD, CONN.; HATBORO, PENNA.; AURORA, ILL.; ELYRIA, OHIO

*... for more details, circle No. 60*

### Operation principles of variable speed transmission

This 12-page booklet details the principles of operation of the Zero-Max infinitely variable speed transmission with output speeds from true zero to ¼-input speed. Standard models are pictured with optional variations, along with typical applications. Installation suggestions, dimensions, ratings, and a description of technical services available are also included. A "how to" section applying to all transmission equipment covers measuring of torque, both starting and running, boosting power or speed, special drives, and motors. *Revco, Inc.*

. . . for your copy circle No. 226

### Complete information on stainless strip steel

Technical information on 20 types of stainless strip steel is included in a 32-page brochure, which analyzes the various types, presenting recommended applications, chemical, physical, and mechanical properties; and corrosion resistance. Two sets of tables are included, one on physical and mechanical properties of various metals and alloys, the other on weight per lineal foot of strip steel for various thicknesses and widths. Booklet is well illustrated. *Superior Steel Corp.*

. . . for your copy circle No. 227

### How to engineer a V-belt drive

This 36-page pocket-sized booklet covers the origin, history, and development of the modern multiple V-belt drive, along with the evolution of standards in engineering the drives. Booklet gives complete information on how to engineer a V-belt drive, providing tables, data, and modifications for drives. Final chapter in the book gives answers to a number of questions relative to basic principles and practices involved in the engineering and use of these drives. (Booklet 20E8297) *Allis-Chalmers Manufacturing Co.*

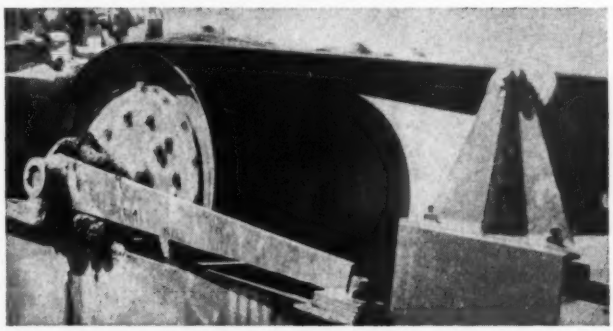
. . . for your copy circle No. 228

### Facts about growth of California branch plants

"Branch Manufacturing in California" is a survey of the growth of branch plants in the state, which discusses geographic grouping in California of plants of out-of-state origin, production relationship to home plants, reasons of locating in California, etc. Authored by *Andrew H. Trice, Ph.D.*

. . . for your copy circle No. 229


**"The Head Pulley with Motor Inside." Safe, compact, simple—no chains, no belts, no sprockets, no exposed motors.**



Built by Yuba for sale in Arizona, California, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington.

*Built and sold in other states by Iowa Mfg. Co., Cedar Rapids, Iowa.*

**IF YOU USE BELT CONVEYORS OR BUCKET ELEVATORS**

## SAVE SPACE, CUT DOWNTIME with YUBA-SCHROCK HEAD PULLEY

All moving parts fit compactly inside pulley shell, protected against weather and dirt, thus practically eliminating pulley troubles. This pulley with motor inside requires no more room than an idler pulley; can be installed quickly. Diameters 10½" to 56". ⅓ to 125 hp. for voltages to 2300. Job proved. Write TODAY for folder and name of nearest distributor.

**YUBA MANUFACTURING CO.**

82 *Pulley and Sprocket Dept.*

PHONE 628 BENICIA, CALIFORNIA

*. . . for more details, circle No. 61 on Reader Service Postcard*

**on this Bin Vibrator**

That's the secret of the Cleveland Air Vibrator record of low maintenance costs. There's little to wear out. A simple mechanism, manufactured to precision standards, and subjected to exacting inspection. There just isn't a better combination for a long, trouble-free life. Write for complete information.

**Air or Electric**

**Portable or Permanent**

**Noiseless or Standard**

1914 Clinton Ave. • Cleveland 13, Ohio
7 Front Street • San Francisco, Calif.

**Send more data on Cleveland Vibrators:**

Name_____

Company_____

Address_____

City_____ State_____

*. . . for more details, circle No. 62*

# NEW EQUIPMENT for Western plant operation, production, and maintenance

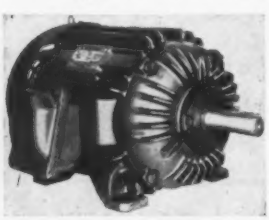
**USE RIP-OUT POSTCARD, page 67, for more information on products described.**

## AIR-OPERATED DRILL
### . . . performs complete cycle automatically

This air-operated drill completes a five-step work cycle automatically; a button starts the motor, drill traverses to the works, feeds at pre-set rate while drilling hole, retracts, and shuts off when hole is completed. Available in 15 models with five speeds for processing a wide range of metals from thin sheets to 6-in. alloy steels, the drills can be used singly or in multiples and may be bench-mounted, suspended, or locked to drill jigs. Drills may be had with 2-, 4-, or 6-in. stroke lengths in speeds of 4,600, 2,500 1,200, 650, and 350 rpm. *Aro Equipment Corp.*

. . . for more details, circle No. 230 on postcard

## SYNCHRONOUS INDUCTION MOTOR
### . . . requires no brushes, rings, windings



The Synduction motor, a synchronous induction motor available in ratings from ¼ to 40 hp., is built on standard induction motor frames and enclosures and uses a simple die-cast rotor, but requires no brushes, slip rings, or windings on the rotor, no separate source of d-c excitation, or special starting equipment as do standard synchronous motors. According to the manufacturer, the motor approaches the efficiency and power factor of squirrel-cage units. It starts as an induction motor with high locked-rotor torque, accelerates and pulls into synchronism quickly, and runs as a synchronous motor. Because of its 157 to 200% pull-out torque, it remains in synchronism regardless of load or line voltage fluctuations. *Allis-Chalmers Manufacturing Co.*

. . . for more details, circle No. 231 on postcard

## SELF LUBRICATED PLUG VALVE
### . . . injection molded of PVC

Designed to reduce replacement costs and downtime, minimize purging, and eliminate product contamination problems, this self lubricated plug valve is injection molded of PVC. Teflon bearing buttons on the plug provide the self-lubricating characteristic. Valve also has a straight through port that makes unimpeded flow conditions possible, adjustments to compensate for wear, positive closing, and self-indicating port positions. A nub on the bottom may be tapped for insertion of a drain plug. Valve is furnished with threaded ends or with socket-type ends for solvent welding, and is available in 1-, 1½-, and 2-in. sizes to match pipe of corresponding nominal size. *Tube Turns Plastics, Inc.*

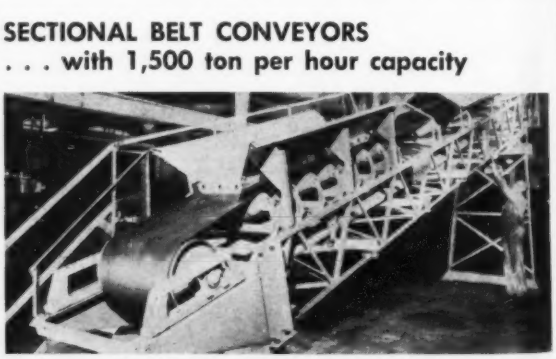
. . . for more details, circle No. 232 on postcard

## STRUCTURAL ADHESIVES
### . . . for general and special-purpose bonding

Lefkoweld adhesives, three adhesives based on epoxy resins, have been designed for general and special purpose bonding of rigid materials such as metals, glass, ceramics, hard rubber, and plastics. They provide full-strength service over wide temperature ranges and are easy to handle, saving welding, riveting, and assembly time. Lefkoweld 46 is for general purpose bonding of like or unlike materials where curing at room temperature is desired; 108 cures at moderately high temperatures and is suitable for intermittent use without degradation at temperatures as high as 400 deg. F. Lefkoweld 201 provides high bonding strengths at temperatures to 200 deg. F. and can be used on all materials. *Leffingwell Chemical Co.*

. . . for more details, circle No. 233 on postcard

## SECTIONAL BELT CONVEYORS
### . . . with 1,500 ton per hour capacity



Pre-bilt sectional belt conveyors in standardized units with capacities ranging up to 1,500 tons per hour incorporate Link-Belt's Series 50 belt idlers, packaged with sectional truss frames and structural steel supporting bents. Conveyors come in 18, 24, 30, and 36-in. widths, with 24 and 42 in. deep trusses. Drives range up to 40 hp. Conveyors can be mounted on almost any type of support to suit varying conditions and are of heavy truss-frame construction, offering a high degree of rigidity and strength per pound of weight. *Link-Belt Co.*

. . . for more details, circle No. 234 on postcard

## FAULT FINDER
### . . . monitors control circuits

This fault finder indicates faults instantly in any one of six monitored control circuits. It requires no warm-up time, is electrically isolated from monitored circuits, and utilizes printed circuits and standard electronic components for minimum maintenance. As long as each monitored circuit is trouble-free, the fault finder's signal

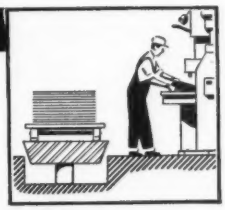
# FOUR WAYS TO CUT MATERIALS HANDLING COSTS

## CASE HISTORIES SHOW HOW TO USE "LIFT-PORTATION" FOR TRUCK LOADING, MACHINE FEEDING AND HEAVY LIFTING

By John R. Queen
Vice President and General Manager

**To maintain profits in the face of the rising costs of our expanding economy, economists forecast the need of a 3% increase in productivity per man each year. Because manufacturing consists largely of movement of materials, a study of material handling methods will indicate many clues to sources of this increased productivity.**

### MACHINE FEEDING

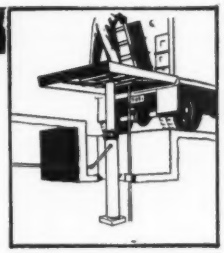


In Washington, D. C., a large printing company studied the manual stoop . . . turn . . . lift . . . twist required to remove paper stock from a skid and place it in position on a power-driven paper cutter.

To speed the operation, the skid is now placed on a Globe Production Lift installed alongside the paper cutter. Manual lifting is completely eliminated. The operator, by push-button control, raises the paper to cutting table level and slides a heavy load of paper under the blade with little effort. As the paper level goes down, the platform is inched upward.

Production increased approximately 30% after installation of Globe Lift.

### TRUCK LOADING

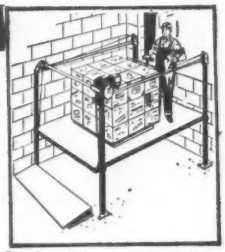


A one-story ground level branch warehouse and service station was faced with the frequent need to load and unload fork lift trucks, weighing from 1½ to 8 tons. Without a loading platform, each operation was slow and hazardous.

When a Globe Loading Lift was installed, fork lift trucks were run onto the platform at ground level, lifted and then run onto the truck.

Loading and unloading that previously took hours is now completed in minutes.

### ELECTRO-LOADER



A maintenance department in a medium size plant was located 3 feet below ground level. Supplies and machines moved into and out of the department by means of a ramp. It was slow, laborious work.

By replacing the ramp with a Globe Electro-Loader, traffic was speeded and muscle power was eliminated.

The Electro-Loader is installed on the floor. No excavation was necessary. Powered by an electric motor, the platform travels between floor and ground level by push-button control.

### TRANS-O-MATIC RAMP

The shipping dock of a large paint factory in Buffalo, N. Y. was continually jammed with trucks. Often trucks waited to load and unload. While the dock was "standard" height above road level, most truck bodies were too high or too low for hand trucks to roll smoothly in or out.

Three self-leveling Trans-O-Matic Ramps were installed so that each truck bed, high or low, was provided with an easily traversed ramp. Loading and unloading was speeded by as much as 50%. Lost time from spilled goods and breakage was eliminated. No longer do trucks wait for platform space.


GLOBE®
PLATFORM LIFTS
PLANTS: PITTSBURGH—PHILADELPHIA
LONG BEACH, CAL.

**ENGINEERING EXPERIENCE AT YOUR SERVICE**

To provide properly planned and integrated material handling systems, experienced Globe engineers are available to study your specific needs. Centrally located on the West Coast, this Globe service is made available to assure you economical, trouble-free installations.

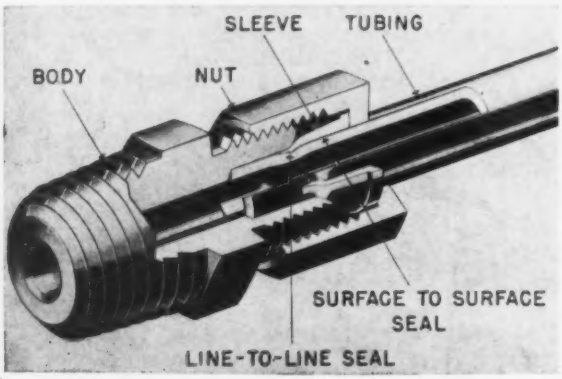
GLOBE PACIFIC HOIST COMPANY
1461 Canal Avenue WI-741M-CH
Long Beach 13, Calif.
Please send me a copy of Time-Saving, Cost-Cutting Case Histories about Globe "Lift-Portation."
NAME .....
ADDRESS .....
COMPANY .....
CITY ..... ZONE .. STATE .....

*. . . for more details, circle No. 63 on Reader Service Postcard*

lamp remains lighted. But if a fault occurs, even momentarily, the lamp is extinguished and remains so until the finder is manually reset. Finder's key component is a cold-cathode gas-filled tube that blocks current flow until its starting anode is energized; current flow ceases when current to its main anode is interrupted. *Westinghouse Electric Corp.*

. . . for more details, circle No. 235 on postcard

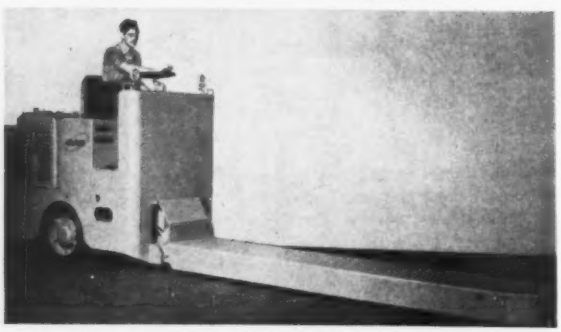
## SELF-ALIGNING TUBE FITTING
### . . . can be installed without disassembly




Selfalign is a self-aligning tube fitting which may be installed simply by inserting the fitting until it bottoms and then tightening the nut. A dual sealing feature assures positive, leakproof connections, according to the manufacturer. Sleeve grips the tubing over a broad area for a surface-to-surface seal, while a thin edge and guiding shoulder form a line-to-line seal with the tubing as the nut is tightened. The fitting is suited for instrumentation and other low and medium-pressure applications using copper and aluminum tubing. Available in brass in sizes 1/8, 3/16, 1/4, 5/16, 3/8, and 1/2 in. *Weatherhead Co.*

. . . for more details, circle No. 236 on postcard

## LOW LIFT PLATFORM TRUCK
### . . . allows driver to sit during operation



A sit-down type electric powered low lift platform truck permits the driver to sit rather than stand during materials handling operations, greatly reducing operator fatigue on long hauls or during continuous operation. According to the manufacturer, operator vision is substantially improved also; if large bulky loads are to be handled, the truck can be modified so that the operator faces away from the load and has a clear view ahead while traveling. The new truck is available in capacities ranging from 10,000 to 20,000 lb. and is equipped with four-wheel steering, hydraulic platform lift, and can also be built with hydraulic power steering. It may be powered with a battery, gas-electric, or diesel-electric unit. *Elwell-Parker Electric Co.*

. . . for more details, circle No. 237 on postcard

## ELECTRIC METAL NIBBLER
### . . . light weight, leaves one hand free

New tool for trimming metal objects, scalloping, and making intricate designs in metal is high-powered enough to cut 18 gage in mild steel (.058 in.). It cuts in a series of punches, 2,500 strokes per min., instead of using shearing technique. Powered by universal type motor, housing of die cast aluminum, total tool weight 5½ lb. *Mall Tool Co.*

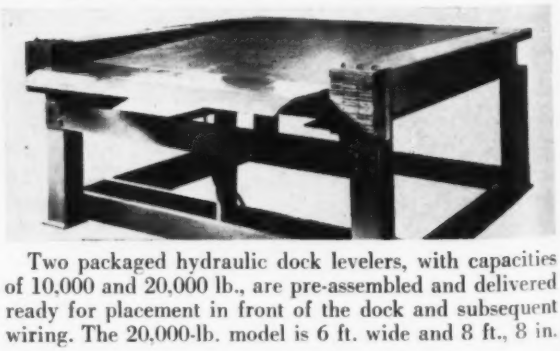
. . . for more details, circle No. 238 on postcard

## ABRASIVE CLEANING TOOL
### . . . cyclone recovers abrasive and dust

Educt-O-Matic is a self-contained abrasive cleaning tool that provides for complete recovery of abrasive and dust. A cyclone puts the dust into an attached bag and allows the abrasive to re-enter the hopper for use again. Air is always free of dust and flying abrasive. About the size of a small vacuum cleaner, the Educt-O-Matic weighs 11 lb. with abrasive and is easy to use inside tanks, on ceilings, and floors. The connection required is a single ½-in. air line; machine operates on 33 to 60 cfm. air supply. *Clementina, Ltd.*

. . . for more details, circle No. 239 on postcard

## HYDRAULIC DOCK LEVELER
### . . . pre-assembled for immediate use



Two packaged hydraulic dock levelers, with capacities of 10,000 and 20,000 lb., are pre-assembled and delivered ready for placement in front of the dock and subsequent wiring. The 20,000-lb. model is 6 ft. wide and 8 ft., 8 in.

long front to back, with raising and lowering action controlled by a push button. It also has a manual floating feature, providing a level ramp which compensates for spring deflection of the truck bed during freight transfer. Each dock leveler has its own hydraulic power unit consisting of a ½-hp., 115/220, single-phase, 60-cycle, totally enclosed, ball bearing motor, and a hydraulic package unit, which consists of a reservoir containing a pump, check valve, relief valve, and solenoid-operated release valve, all assembled as a self-contained unit. *Rowe Methods, Inc.*

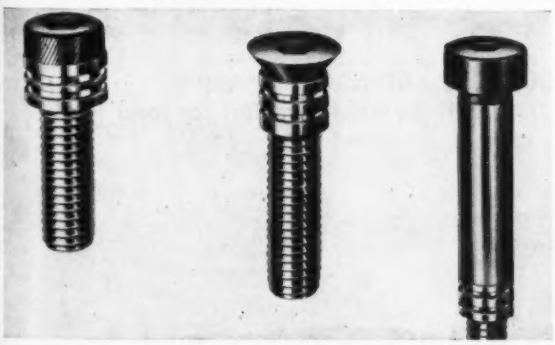
**. . . for more details, circle No. 240 on postcard**

## PARTS HANDLING BASKETS
### . . . for fragile or highly finished pieces

Wire baskets in standard sizes ranging from 18 x 10 x 3 in. to 24 x 14 x 12 in. have been added to Doepke's Nes-Tier line of parts handling equipment. Recommended for handling fragile or highly finished parts, baskets are made of basic steel wire, although they are available in other materials, including stainless steel. A variety of wire sizes is offered, ranging from No. 16 to ½ in., and baskets may be supplied zinc plated or finished in plastic coatings. Nesting or stacking designs are available with fixed or movable handles. *Chas. Wm. Doepke Manufacturing Co., Inc.*

**. . . for more details, circle No. 241 on postcard**

## SAF-LOK SOCKET SCREW
### . . . will not vibrate loose



Security against vibration looseness is the Saf-Lok socket screw's biggest advantage, according to the manufacturer. When the screw is drawn up tight it will not vibrate or shake loose, a feature which makes it a good fastener where motion or movement are involved. The screw has an expansion insert and is made in a complete line of socket shoulder screws, flat head socket screws, and cap screws. It can fit standard and oversized counterbores. After being drawn hand-tight, the screw is tightened further with a key, which causes the expansion insert to spread and fill the cavity. Insert stays in place whenever screw is removed and does not lose its effectiveness when screw is reinserted. *Safety Socket Screw Co.*

**. . . for more details, circle No. 242 on postcard**


**TO PURCHASING AGENTS ONLY!**

**FREE!** Your Choice . . .
Evans KING SIZE 10-ft. White-Tape (EXTRA-WIDE BLADE)
or Evans Pocket 12-ft. White-Tape (REGULAR ½" WIDE BLADE)

Attention Purchasing Agents:
We make this startling offer to introduce your company to Evans' superior King-Size and Pocket White-Tapes, the finest measuring tapes manufactured.
Simply fill in the coupon below and we'll send you, absolutely free and without any obligation, your choice of either our King-Size 10-ft. ($2.39 retail) or Pocket 12-ft. White-Tape ($1.89 retail)! (Offer limited to one tape per purchasing agent.)
We feel that once you try Evans Tapes, you'll never buy another brand. Here's why:

**EVANS KING-SIZE**
**10-ft. ¾" Wide Steel Tape Stands Up Straight for Easy One-Man Measurements.**

The 33% wider blade (full ¾") stays straight up—will not bend when making measurements. Chrome plated zinc die-cast case. Free belt clip for handy carrying and Free Tenite Utility Case. Self-adjusting sliding hook for accurate inside-outside measuring.
*Also available in 6, 8, 12-ft. lengths.*

All EVANS Tapes are marked so your men don't have to figure!

**EVANS 12-ft. Pocket WHITE-TAPE**

Measures a full 12 feet — eliminates adding two measurements as with shorter tapes. Regular ½" wide blade. Chrome plated zinc die-cast case. Self-adjusting sliding hook for 100% accurate inside or outside measurements. Free transparent Tenite Utility Case.
*Also available in 6, 8, and 10-ft. lengths.*

3224

Evans RULE CO., Department 168
400 Trumbull Street, Elizabeth, N. J.

Please send me free sample of (check one)
☐ King-Size 10-ft. Steel Tape ☐ Pocket 12-ft. White-Tape
My two sources of supply for steel tapes are:
1 _____
2 _____
Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

**For quick, efficient service call your Industrial Distributor. He is your most economical source of supply.**

***. . . for more details, circle No. 64 on Reader Service Postcard***

**WHY WAIT FOR TROUBLE?**

A motor failure in your plant or shop can cost you thousands of dollars. Vertical motors are rarely immediately available. Why wait for trouble when you can order at great savings these brand new fully guaranteed NEMA Frame motors. You'll not only save on "first" cost (look at the low prices) but there's no telling how much you'll save by having these motors on hand for an emergency. Order what you need today, at these prices these motors sell fast.

**BRAND NEW ACEC MOTORS** 3 Phase, 60 Cycles, 220/440 Volts, BALL BEARING NEMA Frame

FULLY GUARANTEED

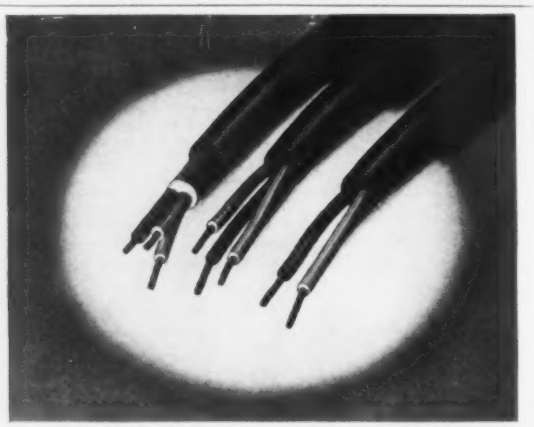
**VERTICAL SOLID SHAFT P FLANGE**

| HP | RPM | NEMA Frame | Unit Price |
|---|---|---|---|
| 1 | 1800 | 203P | $ 34.00 |
| 1½ | 1800 | 204P | 35.00 |
| 2 | 1200 | 225P | 46.00 |
| 2 | 1800 | 224P | 43.00 |
| 2 | 3600 | 204P | 39.00 |
| 3 | 1200 | 254P | 58.00 |
| 3 | 1800 | 225P | 47.00 |
| 3 | 3600 | 224P | 47.00 |
| 5 | 1200 | 284P | 76.00 |
| 5 | 1800 | 254P | 58.00 |
| 5 | 3600 | 225P | 51.00 |
| 7½ | 1200 | 324P | 96.00 |
| 7½ | 1800 | 284P | 75.00 |
| 7½ | 3600 | 254P | 63.00 |
| 10 | 1200 | 326P | 112.00 |
| 10 | 1800 | 324P | 96.00 |
| 10 | 3600 | 284P | 82.00 |
| 15 | 1200 | 364P | 153.00 |
| 15 | 1800 | 326P | 111.00 |
| 15 | 3600 | 324P | 107.00 |
| 20 | 3600 | 326P | 126.00 |
| 25 | 1800 | 364P | 175.00 |

Immediate Delivery From Los Angeles or San Francisco

**TOOLS—EQUIPMENT CORPORATION**
97 Lafayette St., New York 13, N. Y. CAnal 6-1483

*. . . for more details, circle No. 65 on Reader Service Postcard*



**3 NEW LINES OF CORDS AVAILABLE**

Now Anaconda offers a new full line of cords for *each* major application. You can select the *one* best suited for your needs—based on good engineering and sound economy. SECURITYFLEX* Cords for severest applications; INDUSTRIAL "all-purpose" Cords for hard usage; SERVICE Cords used with most appliances. All are made with typical Anaconda emphasis on quality! Call your electrical wholesaler or the man from Anaconda today. And send for Anaconda's new free bulletin: "Portable Cords." Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 55337

*Reg. U. S. Pat. Off.

**ANACONDA®**

*. . . for more details, circle No. 66 on Reader Service Postcard*


## RIGID WEDGE VALVE
### . . . eliminates line movement

These visible wedge valves, now available in three new body styles—tee, horizontal ell, and vertical ell—are rigid so that no line movement is necessary to open or close the units. No hand lifting is necessary when reversing the wedge, while handwheel operation permits opening or closing a line in a minimum of time. All valves have the same center-to-face dimensions as standard tee and elbow pipe fittings. *Hamer Valves, Inc.*

. . . for more details, circle No. 243 on postcard

## ELECTRAULIC LIFTER
### . . . only 39 in. long for easy handling

Load capacity of this new, light-duty electraulic lifter is 1,000 lb., equipped with ¾-hp. motor with magnetic fused starter. Lift height is 5 ft. 8 in., at speed of 15 fpm. Maneuverability is provided by 39-in. length. Platform dimensions are 24 x 24 in. Hinged door on power unit cabinet permits easy access to motor. Side thrust rollers absorb side shock on platform. Overall weight of unit is 455 lb. Also available in battery powered, hand hydraulic, and hand winch models. *Colson Corp.*

. . . for more details, circle No. 244 on postcard

## 30,000-LB. STRADDLE CARRIER
### . . . with hydraulic control for load hooks

Clark's 30,000-lb. capacity straddle carrier is equipped with hydraulic control of load hooks and four-wheel radi-arc steering. Called the Series 93, the machine also has five-speed syncromesh transmission and 15% more horsepower at the wheels than the firm's previous models. All-welded steel construction provides maximum strength with minimum weight, while all power train components are designed for heavy-duty, high-stress operation. Tubular cross members in the frame are used as fuel and hydraulic tanks, increasing the operator's visibility. *Ross Carrier Division, Clark Equipment Co.*

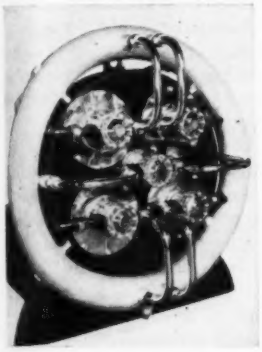
. . . for more details, circle No. 245 on postcard

## STEAM CLEANING GUN
### . . . designed for cool and easy handling

Oakite Hurriclean gun uses a tube within a tube to protect operator from heat of steam, which passes through the insulated interior tube. Cleaning solution passing through exterior tube reduces holding temperature of gun, although steam loses none of its heat. Another new feature of gun is sealed rotary joint, which permits rotating nozzle without twisting heavy solution or steam hose. Gun weighs 6¾ lb. in 3½-ft. length. Also available in 5-ft. length. *Oakite Products, Inc.*

. . . for more details, circle No. 246 on postcard

## MULTIPLE PUMP DRIVE
### . . . can handle nine fluids in nine pumps



Quinn multiple pump drive pictured at left operates nine hydraulic pumps, in this particular application, each pumping 35 gpm. at 1,000 psi. New unit employs a single prime mover—such as electric motor or diesel engine. Total output can be directed to one single operation, or output from each pump can be piped to independent operations. Drive can be used with gear, rotor, vane, or rotor piston pumps. Illustrated pamphlet available from company. *A-1 Iron & Metal Co.*

. . . for more details, circle No. 247 on postcard

## ALL-PURPOSE SPRAY GUN
### . . . works on limited compressed air

This all-purpose spray gun, designated the P-CGA, is economical, according to the manufacturer, because it can be used where a limited amount of compressed air is available. The gun is converted from a suction feed gun to a pressure feed type with the turn of a knob. Suction feed is used for light bodied materials such as lacquer, spray wax or dyes; in spraying primer surfaces or heavy bodied materials the pressure feed setting is best. Gun is equipped with a 1-qt. metal cup and has a pressure cast aluminum gun body, stainless steel fluid needle, and hardened alloy steel fluid tip. *DeVilbiss Co.*

. . . for more details, circle No. 248 on postcard


INDUSTRIAL TESTING EQUIPMENT AND INSTRUMENTS SINCE 1919

Call Pacific SCIENTIFIC

When the HEAT's on

...get GORDON "SERV-RITE" thermocouple supplies

NOW AVAILABLE FROM STOCK!

For your fast, convenient service, Pacific Scientific is now stocking precision quality thermocouple supplies by Claud S. Gordon Co.

Whatever your needs in accurate temperature measurement . . . thermocouple wire, protecting tubes, connectors, heads or for extension wire in any insulation, for practically any installation . . . call Pacific Scientific!

Pacific SCIENTIFIC CO.

LOS ANGELES: 1430 Grande Vista Ave.
SAN FRANCISCO: 25 Stillman Street
SEATTLE: 421 Michigan Street
PORTLAND: 1218 S.E. 7th Ave.
ARLINGTON, TEXAS: 111 E. Main Street

Representing:
•Automatic Temperature Control Co.
•Cal-Tester
•Coates Electric Co.
•Claud S. Gordon Co.
•Lewis Engineering Co.
•Link Engineering Co.
•The MB Manufacturing Co.
•Partlow Corporation
•Soiltest Incorporated
•Tinius Olsen Testing Machine Co.
•Wilson Mechanical Instrument, and Helicoid Gage Divisions of American Chain & Cable Co.

. . . for more details, circle No. 67 on Reader Service Postcard

Handy Pump says:

"STOP waste! . . . dispense liquids from drums, barrels and storage tanks with BLACKMER Hand Pumps"

Blackmer Rotary Hand Pumps

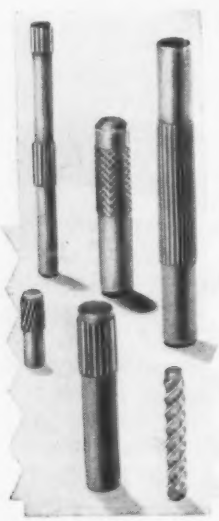
The new Blackmer Flo-Master Hand Pumps

liquid materials handling®

BLACKMER

Industrial, Hand and Truck Pumps, Strainers, Pressure Control Valves
BLACKMER PUMP COMPANY, GRAND RAPIDS 9, MICH.
DIVISION SALES OFFICES — NEW YORK • ATLANTA • CHICAGO
GRAND RAPIDS • DALLAS • WASHINGTON • SAN FRANCISCO
*See Yellow pages for your local sales representative*

*. . . for more details, circle No. 68 on Reader Service Postcard*



CUT FASTENING COSTS with HASSALL THREADED PINS

- Low cost
- To your specifications
- Roll threaded for greater strength
- Large or small quantities
- Close tolerances
- Any finish • All metals

We are saving many of our customers from 20% to 50% on their special small threaded pins. These threaded pins may be made to your specifications in a wide variety of metals and finishes. Large or small runs are economical.

Let HASSALL quote on your small threaded pins . . . we can show you real savings.

Other HASSALL Specials

- Rivets
- Nails
- Studs
- Hinge Pins
- Screws
- Drive Screws
- Machine Screws
- Fasteners
- Small parts

WRITE FOR CATALOG . . . . . with it we will send you our popular decimal equivalent wall chart.
John Hassall, Inc., Box 2186, Westbury, L. I., N. Y.

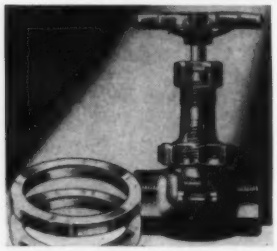
HASSALL

SINCE 1850

NAILS, RIVETS, SCREWS AND OTHER COLD-HEADED FASTENERS AND SPECIALTIES

*. . . for more details, circle No. 69 on Reader Service Postcard*


## BRONZE GLOBE VALVE
### . . . rated at 200-lb. S.P.



These bronze globe valves, rated at 200-lb. S. P. and 400-lb. W.O.G., may be used where a high-pressure, throttling globe valve is needed. Bodies and bonnets of these valves are made of S-1 bronze, a very high grade close-grained valve bronze noted for high density, strength, and corrosion-resistance. Valves have flat-seat design; seats and discs are lapped to obtain a smooth, flat, leak-proof seal. Other features include a deep packing nut for firm thread engagement; union bonnet, a handwheel which is easy to turn, and back seats which facilitate repacking while the valve is wide open. *Lunkenheimer Co.*

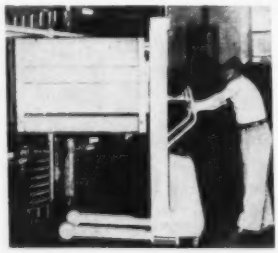
**. . . for more details, circle No. 249 on postcard**

## VACUUM CLEANER
### . . . converts to a blower

In addition to its functions as a vacuum cleaner, Black & Decker's Model No. 65 converts to a blower with a change in hose connections. Standard attachments to the cleaner, which weighs 56 lb., include a hose swivel, 6-in. nozzle, 6-in. brush, and crevice tool. Mounted on two 8-in. rubber wheels and a front caster, the cleaner rolls easily, but has a locking device on the caster which holds the machine stationary when desired. The Neoprene hose will pull the cleaner behind it or, when the cleaner is stationary, stretch out in all directions up to 15 ft. Cleaner is powered with a 1¼-hp. universal motor and can remove up to 3¾ gal. of liquid or ⅞ bu. of dry material before emptying is necessary. *Black & Decker Manufacturing Co.*

**. . . for more details, circle No. 250 on postcard**

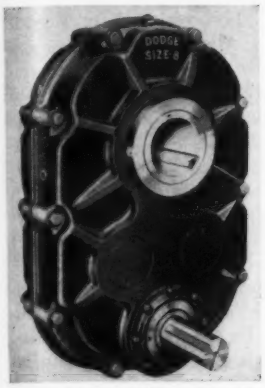
## VERSATILE PORTABLE LIFT
### . . . acts as truck, elevator, crane



A 1,000-lb. capacity telescoping portable lift, manually propelled by one man, can act as a straddle fork truck, portable elevator, or shop crane. The unit features a battery-powered full lift of 112 in. but has a collapsed height low enough for operation in rail cars and highway trucks, in elevators, and in other low headroom areas. Push-button control station is connected by a retractable cord permitting control of the lift from any position around the unit, or from the lift itself when it is employed as a portable elevator. The lift, which is 78¼ in. high, has a built-in taper charger which operates from any 110-v. outlet. *Oster Manufacturing Co.*

**. . . for more details, circle No. 251 on postcard**

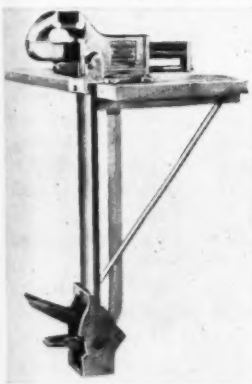
## SPEED REDUCERS
### . . . shaft-mounted with V-belt drive



Dodge has added to its Torque-Arm line two shaft-mounted speed reducers with capacities from 1 to 60 hp. and output speeds from 12 to 365 rpm. Size No. 8, with a capacity of 60 hp. at 100 rpm., can be mounted on shafts up to 5 in. diameter. No. 11, at the other end of the line, has a capacity of 1.3 hp. at 100 rpm. No foundation, flexible couplings, or sliding base is required for either of these reducers, which are both mounted directly on the shaft. Units are driven through a V-belt drive. *Dodge Manufacturing Corp.*

**. . . for more details, circle No. 252 on postcard**

## FOOTLOCK VISE
### . . . entirely operated by foot



A two pedal Footlock vise is operated when one man presses a pedal with his foot, automatically causing clamping or releasing. Mechanically operated, the vise is sensitive to light or heavy clamping pressure and will adjust accordingly. It is available in 4½-in. jaw width with 6¼-in. jaw opening, and weighs about 75 lb. Vise can be bolted to any bench and is adjustable in height. *Palomar Manufacturing Co.*

**. . . for more details, circle No. 253 on postcard**

## DOUBLE-DUTY CASTER
### . . . has four-position swivel lock

A four-position plunger-type lock converts this swivel caster into a stationary model. Swivel lock caster is available with all types of treads—semi-steel, soft or hard rubber, neoprene—and when mounted is flexible and easy to steer. *Darnell Corp., Ltd.*

**. . . for more details, circle No. 254 on postcard**

## AIR-COOLED TORCH
### . . . features high current capacity

New Heliarc torch for inert gas shielded arc welding of light metals has continuous-duty current capacity of 130 amp. (150 amp. for reduced-duty cycle). It can be used on many jobs that formerly required a water-cooled torch, cutting costs in original installation and also maintenance. Equipped with either 12½- or 25-ft. cable and argon hose assembly. *Linde Air Products Co., division of Union Carbide and Carbon Corp.*

**. . . for more details, circle No. 255 on postcard**

**Are you looking for better methods for stripping paint?**

Do some finishes resist your present stripping methods? Do rejects form a bottleneck in your production line?

Oakite's FREE booklet on "How to STRIP PAINT" will help you find more efficient procedures. You'll want to read more about: The best way to strip parts too large to be soaked in tanks (*see page 3*); The best way to strip large areas of structural metal (*see page 5*); What strippers are best for oil-base paints? . . . Synthetic enamels, alkali-resistant plastics or resin-based paints . . . Japans, wrinkle finishes, nitrocellulose lacquers, alkyds, phenolics and ureas (*see page 12*).

**FREE** For a copy of "How to STRIP PAINT" write to Oakite Products, Inc., 1001 E. First St., Los Angeles, or 681 Market St., San Francisco, Calif.

SPECIALIZED INDUSTRIAL CLEANING
**OAKITE**
MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

*. . . for more details, circle No. 70 on Reader Service Postcard*

**MORE WEAR PER PAIR**

SURETY
**TRIPL-PALM**
**COATED FABRIC GLOVES**

**2 way savings**

**TOUGHEST WHERE WEAR IS ROUGHEST**
Tripl-Palm design eliminates the usual "failure points"—provides extra heavy palm coating for extra wear and comfort.

**NO SEAM HERE**
Nothing to rip out — wing thumb construction assures multiplied service life.

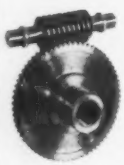
**SEND FOR FREE BULLETIN TODAY**
Get all the facts, write for Tripl-Palm bulletin.

THE SURETY RUBBER CO. CARROLLTON, OHIO

Western Division: 544 Market St., San Francisco 4, California

*. . . for more details, circle No. 71 on Reader Service Postcard*

50 YEARS GEAR SERVICE TO INDUSTRY



The More Particular You Are In Selecting Gears, The More Likely You Are To Select JOHNSON

JOHNSON GEAR AND MANUFACTURING CO.
8th & PARKER STREETS
BERKELEY 10, CALIFORNIA

. . . for more details, circle No. 72 on Reader Service Postcard



NEVER OBSOLETE

ADJUSTABLE
STORAGE RACKS
*Instantly Interchangeable for*
PALLETS • BULK • SKIDS • DIES

The secret is the "FLOATING WEDGE LOCK"

Patents pending
New, different assembly principle—No tools, nuts, bolts, erection

As your needs change — *so do* STURDI-BILT *Adjustable* STORAGE RACKS!

This revolutionary new storage rack is designed to handle pallets, skids, dies or bulk *interchangeably* in a matter of seconds. Not only do you have new freedom in *types of storage*, but with on-the-spot respacing of the vertical openings, you can handle more efficiently *any* daily storage fluctuations or demands. One or two pallet width openings. Heights to fit your needs — and they *stack* for added utility.

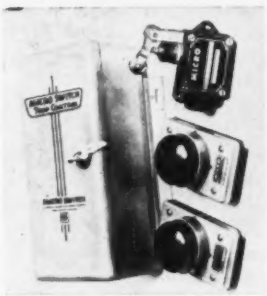
WRITE TODAY for more information about the *only* system that *plans* for the future!

A few territories available for qualified

Sturdi-Bilt ENGINEERING CO. INC. Dept. V1-5
2501 Peterson Ave., Chicago 45, Ill.

. . . for more details, circle No. 73 on Reader Service Postcard


## NEW TWO-HAND CLUTCH CONTROL
### . . . increases production and operator safety



This new system, known as Micro Switch trip control, can increase productivity of manually-operated power machines by as much as 20%, according to manufacturer. This is made possible by simplified, fingertip operation of control switches and other features which reduce operator fatigue and speed up machine's production. Photo shows complete packaged set, including hand switches, limit switch, and control box for use with light mechanical clutch machines, air presses, etc. New contact system minimizes possibility of accidental operation of unit. *Micro Switch, division of Minneapolis-Honeywell Regulator Co.*

. . . for more details, circle No. 256 on postcard

## 4-in-1 PORTABLE BENDER
### . . . permits bending operations on the job

This 4-in-1 bender will bend flat bar up to 2½x½ in., round and rectangular steel and reinforcing steel bars up to 1 in., steel pipe from ¼ to 1¼ in., and steel, aluminum, and copper tubing up to 1⅝ in. The portable tool can be mounted on truck, workbench, vise, or metal stand, and can save much time by providing on-the-job bending, according to the manufacturer. Available in three models, it is useful for maintenance shop and department personnel, welders, and production men. *J. B. Sebrell Corp.*

. . . for more details, circle No. 257 on postcard

## CART-N-GRAB ARMS
### . . . handle cartons without pallets

Hyster's Models UC-30 and YC-40, 3,000 and 4,000-lb. capacity lift trucks, can be equipped with Cart-N-Grab arms which eliminate the need for pallets in handling cartons and packages. Cart-N-Grab will accommodate packages from 22⅛ to 70¾ in., holding them firmly. *Hyster Co.*

. . . for more details, circle No. 258 on postcard


SULPHURIC ACID
for the west
66° BAUME 20%
98% OLEUM
and special grades

Garfield CHEMICAL & MFG. CORP.
ESTABLISHED 1916
700 CRANDALL BUILDING
SALT LAKE CITY, UTAH

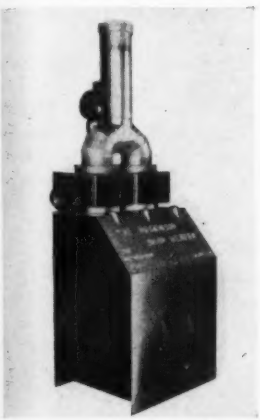
. . . for more details, circle No. 74 on Reader Service Postcard

## METERING VALVE
### . . . fingertip control of gases and liquids

New leakproof metering valve is designed for high operating pressures and temperature range and performs equally well with gases and liquids. Panel mounted, it can be overhauled without disturbing plumbing or mounting. Valve operates efficiently at pressures up to 6,000 psi. or on vacuum applications, and gives hairline control of a water manometer when connected directly to pressures of 6,000 psi. Temperature range from minus 100 to plus 500 deg. F. *Robbins & Assocs.*

**. . . for more details, circle No. 259 on postcard**

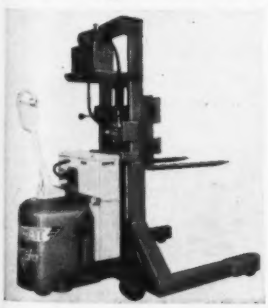
## HEATER-INCINERATOR
### . . . uses plant rubbish as fuel



Hoskinson incinerator-stove unit will pay its own way, says manufacturer, by providing odorless, clean heat from burning waste and rubbish. During summer months, it can continue to be used as an incinerator by disconnecting stove area and removing free heater coils. Does not require permanent chimney; can be operated up to a week without removing ashes. *Hoskinson Industries*

**. . . for more details, circle No. 260 on postcard**

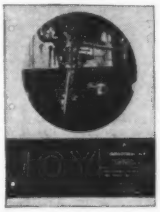
## BATTERY-POWERED TRUCK
### . . . is light but stable



Model STF40 is a straddle-type electric truck which weighs barely half as much as a conventional fork truck of like capacity. According to the manufacturer, the unit has ample stability without counterweighting because the four wheels are on the floor at all times. The floating head precludes any of the weight being transmitted to the drive wheels so even when heavy pallet or unit loads are being stored ceiling high, the unit is stable. Good traction is assured because the floating head operates like a tractor pulling a trailer with no weight on the driving mechanism. The 4,000-lb. capacity straddle truck has an overall height of 83 in. and a fork elevation of 68 in. It is designed for one-man walking-operator use through pushbuttons on the handle. *Barrett-Cravens Co.*

**. . . for more details, circle No. 261 on postcard**

- Water-cooled
- Double-Acting
- Small Floor Area
- Replaceable crosshead guides
- Replaceable cylinder liners
- Force-feed lubrication
- 15 sizes—172 to 881 CFM
- 15 to 75 H.P.
- 30 to 150 psi.



WRITE FOR FREE CATALOG A-43A

W&D 1-5528

Consult a Joy Engineer

JOY

JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH 22, PA.
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

*. . for more details, circle No. 75 on Reader Service Postcard*

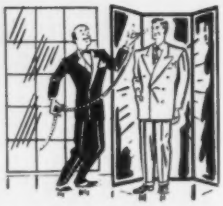
**STRONG** *enough for any shipment*
**LOW** *enough in Cost to discard after use*
**LIGHT** *enough to cut shipping costs*

**GREAT LAKES CARBON CORPORATION**
612 So. Flower St., Los Angeles 17, Calif.

**EVJU PRODUCTS COMPANY**
*Sales Agents for California and Hawaii*
465 California St., San Francisco
6820 Rita Ave., Huntington Park

*. . . for more details, circle No. 76 on Reader Service Postcard*

# TAILORED TO FIT YOUR NEEDS — *Perfectly!*



BERGER MANUFACTURING DIVISION — REPUBLIC STEEL CORPORATION

CONVERTIBLE SHELVING

New world craftsmanship in the Petley drafting room is what you get when you commission us to tailor-to-measure your shelving requirements.

These all-steel, shop-fabricated units are equipped with interchangeable shelves, dividers, bin fronts, inserts—in any variation desired—giving an unlimited range of shelf spacing.

Available for quick delivery from local stocks.

OTHER BERGER PRODUCTS

Steel shelving, shop desks, tool room equipment, lockers, bar racks, office desks, files and tables.

PETLEY INCORPORATED — INDUSTRIAL AND AUTOMOTIVE EQUIPMENT ENGINEERS

*Representatives:*
BERGER MFG. DIVISION
REPUBLIC STEEL CORPORATION

899-73rd Ave., Oakland 21, Calif. Telephone: TRinidad 2-7621

5424 E. Slauson Ave., Los Angeles 22, Calif. Telephone: RAymond 3-3327

*. . . for more details, circle No. 77 on Reader Service Postcard*

Stocked in all sizes #7/0 thru #14.

*Special diameter sizes made to order*

"Stanho" makes a complete line of SOLID Taper Pins, Straight Pins, quality Cotter Pins, Woodruff Keys, Machine Keys and special parts to order.

**Proven Durability plus Precision and Economy... Clean Bright Finish**

"Stanho" Taper Pins are made from selected steel bars, microscopically free from any defects. Milled or centerless ground precision types. Also available made from Stainless Steel, Monel, Brass, Aluminum or other metals to your specifications.

*Prompt shipments . . . in bulk or conveniently packaged.*

*Write for catalog and prices*

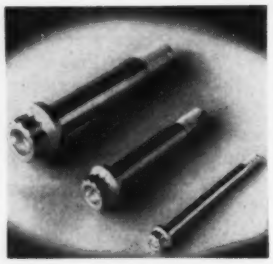
STANDARD Since 1872 HORSE NAIL CORP NEW BRIGHTON PA

JM-7

Western Factory Sales Representative
GRETHER & GRETHER, P. O. Box 47, Stockton, California

*. . . for more details, circle No. 78 on Reader Service Postcard*


## 180,000-PSI. TENSION BOLT
### . . . strongest threaded fastener made



Outstanding feature, states manufacturer, of these high-strength steel bolts is that they also have exceptional resistance to dynamic fatigue or shock loading. Endurance limit of EWB-18 ranges from 50,000 to 60,000 psi., as compared to 40,000 psi. for best present 160,000-psi. steel fasteners. New 12-point, external wrenching head permits maximum tightening. *Standard Pressed Steel Co.*

. . . for more details, circle No. 262 on postcard

## PACKAGED INDUSTRIAL FAN
### . . . easily installed, needs little floor space

Series 106 is a new line of industrial fans incorporating streamlined design for higher efficiency and covering full range of industrial needs. Model shown is a packaged, completely self-contained unit (fan, motor, and drive) which eliminates need for separate motor foundation and reduces floor area requirement. Standard fans in sizes 11 through 37 are available for volumes to 47,000 cfm. operating with static pressures to 18 in. Packaged fans available for volumes to 23,000 cfm. at static pressures to 10 in. *American Blower Corp.*

. . . for more details, circle No. 263 on postcard

## AIR FILTRATION
### . . . here's a new super-cleaning process

Wheelabrator Ultra-filtration employs conventional Wheelabrator Dustube collectors of tubular cloth filter type, charged with a new filter aid that precoats filtering surfaces. This furnishes a highly efficient matrix upon which fine particles of atmospheric dust and tarry matter are collected. One application of filter aid will last for two or three years, and only maintenance required is the infrequent cleaning and recharging of the collector. Recommended for electrical control rooms, laboratories, precision manufacturing areas, radioactivity hazard, and other industrial applications. *Wheelabrator Corp.*

. . . for more details, circle No. 264 on postcard


Improve Quality of Your Product

*with*

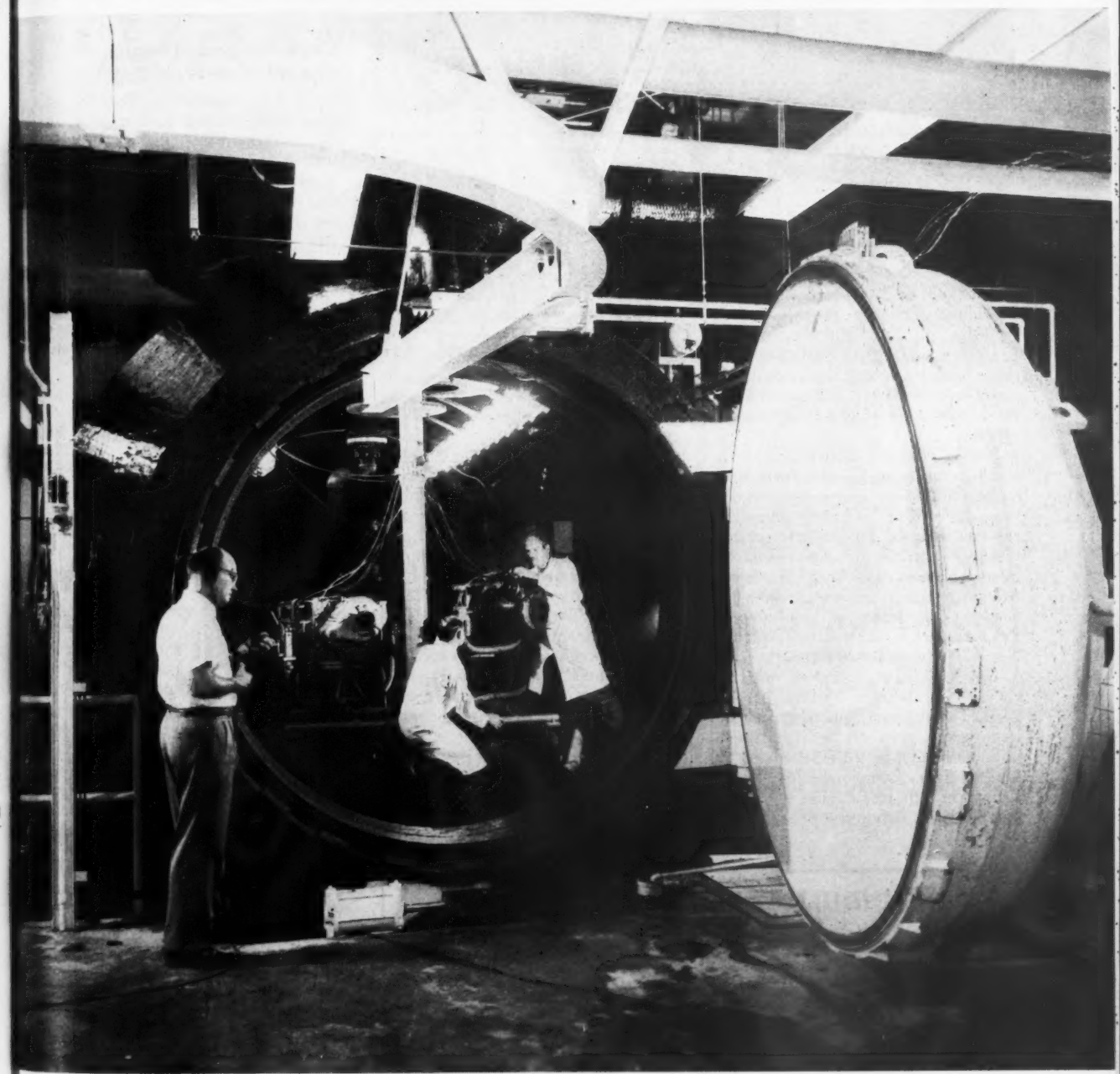
SORBOCAST
CAST IRON
Dayton Foundry

HOLLYDALE, CALIFORNIA NEvada 6-1251

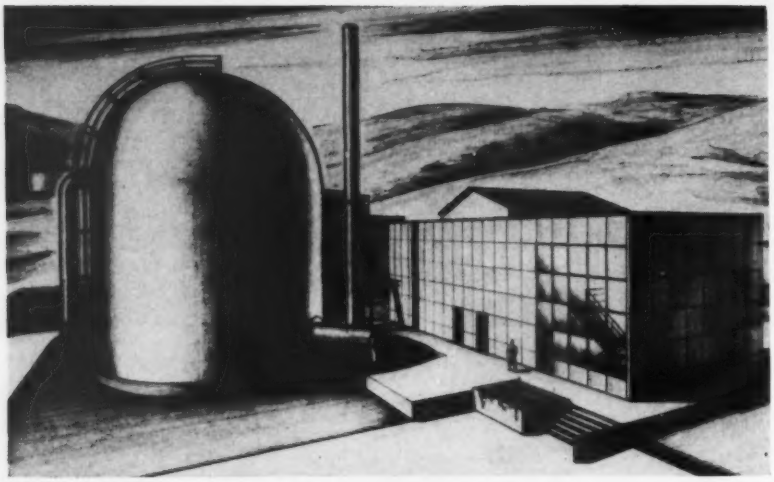
*. . . for more details, circle No. 79 on Reader Service Postcard*

# THE INDUSTRIAL WEST ON ITS WAY

plants • production • distribution • personnel



**AT NEW $5,000,000 JET AIRCRAFT TEST FACILITY of Garrett Corp.'s Airesearch Mfg. Div., Phoenix, Ariz., gas turbines are wheeled into giant altitude chamber where altitudes up to 15 mi. are created, plus diving or climbing conditions. The 90,000-sq. ft. plant, containing 75 production test cells, has a mammoth compressed air system to supply 430 lb. per min., at from plus 500 to minus 70 deg. F., continuously at 15 psi.**



**BOILING WATER REACTOR** which will furnish steam for General Electric's new atomic laboratory in Pleasanton, Calif., will be located in the dome-shaped structure shown in the foreground of this architect's version.

# GE breaks ground for atomic lab

General Electric Co. has broken ground on a 1,600-acre site near Pleasanton, Calif., for the three initial facilities of its Vallecitos Atomic Laboratory. Estimated at $10,000,000, these facilities, which will include an experimental reactor, will be used for the development of peacetime atomic products.

Heading the new laboratory, which will be used to seek new information on atomic energy and speed the development of practical, economical reactor systems for electric power generation, will be *Dr. Ralph Bennett*. Bennett came to GE from the Knolls Atomic Power Laboratory, where he headed the technical department. Prior to that he was director of the Naval Ordnance Laboratory.

The Vallecitos laboratory will be GE's second atomic facility in the West. The Atomic Power Equipment Department, presently headquartered in Schenectady, N. Y., is scheduled to join the firm's Commonwealth Edison Project in San Jose during the latter part of 1956, bringing total GE personnel there to about 500.

The existing factory building on the San Jose site comprises 146,000 sq. ft. of manufacturing floor space, most of which is currently utilized by GE's Medium Induction Motor Department. Until the end of 1957 the motor department will share space with atomic equipment.

Construction has started in San Jose for facilities estimated at $2,000,000 and including an 80,000-sq. ft. building to be used for temporary office space for the atomics department, and two testing facilities which simulate reactor conditions for testing fuel elements, control rod drives, etc., without irradiation. The San Jose plant will ultimately manufacture power reactors, research and test reactors for advanced nuclear research and testing, fuel elements for the reactors, and components such as electromagnetic pumps.

The Atomic Power Equipment Department, which grew out of an atomic power study by *Francis K. McCune*, and a group of 100 people established to design, manufacture, and market research and test reactors and atomic components, is set up along the lines of a small individual company. The department, of which the Vallecitos laboratory will be a part, will have its own engineering, manufacturing, marketing, finance, and employee and community relations sections located in San Jose. *George White* will be general manager of the San Jose facilities; *Raymond C. Freeman* will be manager of engineering, while *John M. Hobbs* will be manager of manufacturing.

## Clark Equipment begins operation on West Coast

Clark Equipment Co., Battle Creek, Mich., has started operating on the West Coast in a 40,000-sq. ft. structure in Richmond, Calif. The building is serving as a modification center and parts depot for slow-moving parts for the firm's Industrial Truck Division.

Among West Coast plant operations are the fabrication and installation of special attachments for fork lift trucks, and assembly completion of lift trucks manufactured in Battle Creek.

## Savolt formed to help plants save on utility bills

**Wesley Bush**

Savolt Corp. has been formed in Newport Beach, Calif., to help industry save money on utility bills. Composed of registered engineering specialists who survey industrial utility usage on a guaranteed basis, charging only if savings are shown, the firm is serving the Southern California area.

Headed by *Wesley Bush*, a registered professional electrical engineer, Savolt Corp. works under a plan based on thorough engineering analysis of the consumer's use of utilities in his particular operation to determine what refinements can be made and what rates are specifically applicable to him according to local power regulations in the specific area involved.

The Savolt staff is available for the design of new facilities, extensions, or alterations to enable the utility consumer to be assured of "built-in" savings which are available when consideration is given the matter during early stages of design to keep pace with automation and increased labor costs.


**THE INDUSTRIAL WEST ON ITS WAY**

**appears monthly as a special service feature**

**in** Western Industry **. . . serving plant operating executives in the nation's fastest growing region.**

609 Mission St., San Francisco 5, Calif. Phone YU 2-4343

# *speed...and handling...* MAKE WINNERS!

Get out in front of your competition... with National Carloading which is always ahead of its competition in its service to Western industry. In the long run... from your suppliers in the East... or getting your products to the profitable markets East of the Mississippi... National sets a record for fast, frequent, dependable delivery.

National's winning pace eliminates lost motion on the movement proper through careful routing... at terminals and transfer points by efficient, mechanized equipment and time-conscious personnel. You can avoid lost motion too. One call to your local National station gets you National's complete one-responsibility, one-invoice service. It puts the entire National network of 150 stations serving some 30,000 communities at your service, with instant communication for tracing, for re-routing and re-consigning where needed.

In business today, the race is to the swift. Let National's expediting speed your turnover, bring in those profits faster. Specify SHIP VIA NATIONAL CARLOADING CORPORATION on all your orders. Tell your own personnel to use National on your outbound LCL freight. On any track... it's "The Best Way."

**FREE!** *"National News," the monthly publication of National Carloading Corporation, provides a fast-moving account of the latest in business and transportation news. You'll enjoy it. You'll profit from it. A note on your letterhead will bring it you... fast!*

## National Carloading Corporation

JUDSON SHELDON DIVISION • JUDSON FREIGHT FORWARDING DIVISION

*World Headquarters: 19 Rector Street, New York 6, N. Y.*

Pacific Coast Headquarters: 354 S. Spring St., Los Angeles, Cal., Trinity 8421
District Office: 6625 White-Henry-Stuart Bldg., Seattle, Wash., Mutual 1490
District Office: 245 California St., San Francisco, Cal., Garfield 1-6279

*... for more details, circle No. 80 on Reader Service Postcard*

**ASSEMBLY AND MODIFICATION** work will take place on products of Reliance Electric & Engineering Co. and its subsidiary, Reeves Pulley Division, in this new 12,000-sq. ft. plant in Burlingame, Calif.

# New Western plant for Reliance, Reeves

J. W. Corey

It's open house the entire week of May 21 at the new $500,000 assembly plant and distribution center in Burlingame, Calif., of Reliance Electric & Engineering Co. and its recently acquired Reeves Pulley Division. Formal dedication, scheduled for May 24, will attract many Bay Area dignitaries and industry leaders, as well as personnel from Cleveland, Ohio.

The new 12,000-sq. ft. plant was completed on March 15. Systematic relocation of Reliance warehouse activities and Reeves assembly plant work has been taking place. Both had outgrown existing facilities in San Francisco. Operations of Reliance and Reeves in the assembly, modification, and distribution of motors and drives is being consolidated in the new plant, which is located on Bayshore Freeway in the Millsdale Industrial Park. Plenty of space has been allowed for future building expansion.

*J. W. Corey*, president of the company (and also president of the National Electrical Manufacturers Assoc.) will travel West for the open house, and will be on hand during the ceremonies on May 24.

A. C. Perrin

R. G. Sullivan

Heading up Western sales for the company is *Andrew C. Perrin*, electrical engineer and sales application engineer for the firm during the past nine years, the last three in his present assignment. *Robert G. Sullivan*, who has been active in Western engineering and manufacturing since 1936, is in charge of the Reeves activity at Burlingame. He supervised establishment of the Reeves West Coast plant in 1951. The two companies merged a year ago.

The facility will provide new drives and renewal parts as required by users served by Reliance offices in Los Angeles, Maywood, Phoenix, Seattle, Portland, and Spokane. Complete stocks of Standard V*S and Reeves variable speed drives, motors, and gear motors will be maintained. This stock will be augmented by parts required to make up specifically modified versions of standard a-c motors for pump, fan, and direct-coupled applications. Reeves items included will be motodrives, motor pulleys, and transmissions. The V*S drives up to 7½ hp. will be stocked with basic drive functions. Such additions as jogging and dynamic braking, etc., will be part of the new plant's regular service.

Smaller all-electric drives in the ¾ to 3-hp. size range will also be ready for immediate delivery anywhere in the Western area served by the new plant. Replacement parts for motors and drives will play an important part in the operations.

## Sands Associates opens new Palo Alto office

Sands Associates, Inc., industrial marketing consultants serving electronics equipment manufacturers and laboratories and headed by *Leo G. Sands*, has opened a new office at 535 Ramona St. in Palo Alto, Calif., to permit closer liaison with the electronics industry concentrated on the San Francisco peninsula.

Services of the firm, in addition to market analysis, product evaluation, sales training, etc., include preparation of technical instruction books and maintenance manuals to commercial and military specifications.

*Harold Judge*, engineer with broad experience in the electronics and physics fields, has joined the firm as manager of engineering services. He will supervise engineering consultant work and handbook production.

## American Pulley opens West Coast warehouse

American Pulley Co. has opened a West Coast warehouse in Oakland, Calif., to increase its service to West Coast distributors and customers. The Philadelphia firm makes power transmission and materials handling equipment.

The firm will also move its San Francisco offices to Oakland. *Gerard P. Weishaar*, Western regional manager, will be in charge of the new warehouse as well as distribution and sale of the company's products in the 11 Western states. *William Krassig* has been appointed warehouse supervisor.

**INDUSTRIAL PROPERTIES**
*Warehouses - Buildings - Lofts - Plants - Factory Sites—Appraisals*

**SALES • LEASES**
*Complete Coverage Up-to-the-Minute Lists*

**COLDWELL, BANKER & COMPANY, REALTORS**

57 Sutter Street, SAN FRANCISCO 4, Phone SUtter 1-5420
425 - 15th Street, OAKLAND 12, Phone GLencourt 1-7300
900 Wilshire Blvd., LOS ANGELES 17, Phone MAdison 6-0611
1009 Jay Street, SACRAMENTO 14, Phone HUdson 1-1407
3018 Central Avenue, PHOENIX, ARIZONA, Phone AMherst 6-8445

*. . . for more details, circle No. 81 on Reader Service Postcard*



*For more details, adv. on opposite page, circle No. 82 on Reader Service Postcard* →

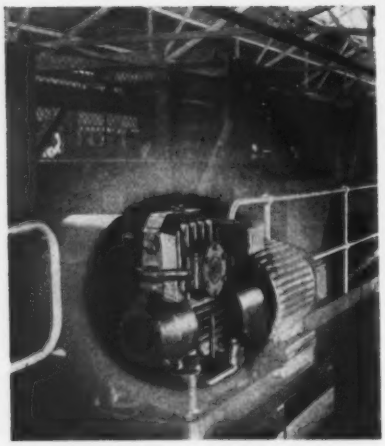
PONTOONS FOR
UTAH CONSTRUCTION
COMPANY

DESIGNED BY
UTAH CONSTRUCTION
COMPANY

FABRICATED BY
**Kaiser Steel**
Fabricating
Division
NAPA AND FONTANA, CALIF.

**BUILT TO SERVE THE WEST..THROUGH PRECISION STEEL FABRICATION**

*STATISTICS: 87 PONTOONS 24' LONG BY 6'X4'6"*
*OVER-ALL WITH SADDLE TO ACCOMMODATE*
*30" DREDGE DISCHARGE LINE*



Belt-type conveyor moves 90 tons an hour

# RADICON Speed Reducer

## *Moves Coal Along Gas Plant 'Freeway'*

A coal gas producing plant is dependent upon its conveyor system! The speed reducer driving the conveyor must be rugged, reliable and efficient.

In the above installation, for example, the fan-cooled Radicon—model 8 RHU (ratio 40:1) was specified. Using a 7½ hp motor at 900 rpm, the Radicon output shaft delivers a powerful 22 rpm—at 84% efficiency.

The Radicon is directly coupled to the conveyor head shaft allowing the drive and motor to lie alongside . . . bedplate for Radicon and motor is only 20" wide. This improved layout eliminates high initial cost and maintenance so often associated with secondary chain drives.

*The 8 RHU Radicon sells for $395.00—immediate delivery. Packaged Drives supplied by authorized David Brown factory branches and distributors.*

Portland, Oregon: Zidell Machinery & Supply Co.
San Francisco-Oakland: George M. Philpott Co., Inc.
Seattle, Washington: Cascade Machinery Co.

DAVID BROWN INC.
999 Boocher Street, San Leandro, California
6025 Atlantic Boulevard, Maywood, California

Gear Products for: paper and pulp mills, chemical plants, mines, food processors...conveyors, hoists, agitators, screens, deckers, filters, canning machines, and other industrial equipment.

*. . . for more details, circle No. 83*

**HEADING UP** E. C. Buehrer Assoc. are Owen L. Jenkins, president, and Alvin Hamre, vice president.

### E. C. Buehrer Associates marks fortieth year

Materials handling distributor covering the northern California region, E. C. Buehrer Associates has celebrated its fortieth anniversary. The firm started its fortieth year in business with a January 1 move to larger premises. Formerly located at 351 Fifth St. in Oakland, Calif., the supplier is now enjoying 1,200 sq. ft. of additional space for service parts facilities at 253 Fourth St.

Representatives for nine manufacturers—among them Nutting Truck & Caster, Automatic Transportation, Idea Stencil—the firm's six salesmen are headed by *Owen L. Jenkins*, who has been president of the company for six years. Assisting him is *Alvin Hamre*, vice-president.

Stocked in the new facilities is $92,000 worth of equipment, $38,000 of which is accounted for by repair and replacement stock. This company is the second oldest Automatic Transportation Co. dealer in the U. S.

### Telautograph to move manufacturing to L. A.

Telautograph Corp., New York, plans to move its manufacturing operations to Los Angeles where it has broken ground for an 80,000-sq. ft. plant to be completed this summer. The $1,000,000 facility will also house two subsidiaries, Walsco Electronics Corp. and Walter L. Schott Co.

The move is being made to expand production capacity and to concentrate manufacturing near the center of the electronics industry which is rapidly growing in Southern California. Last spring the firm shifted its corporate executive offices, located in New York for 68 yr., to a temporary location in Los Angeles.

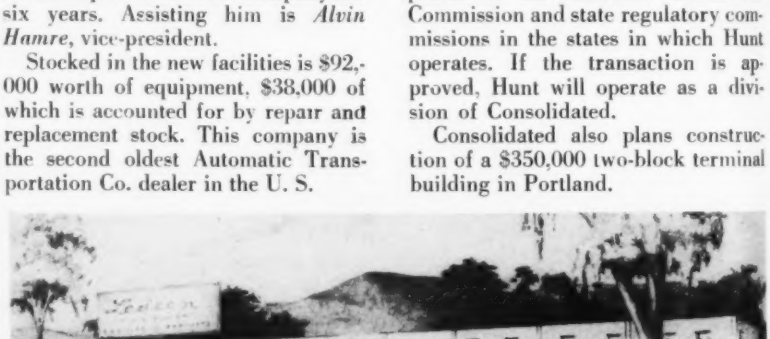
The company plans to construct two buildings on the five-acre plot, one for executive offices and the second to house the two subsidiaries.

### Consolidated Freightways buys Hunt Transfer Co.

Consolidated Freightways of Portland, Ore., has signed a purchase agreement under which it acquires Hunt Transfer Co., Inc., Portland. The agreement contemplates issuance of 20,896 shares of Consolidated stock in exchange for all outstanding Hunt stock.

The transaction must have the approval of the Interstate Commerce Commission and state regulatory commissions in the states in which Hunt operates. If the transaction is approved, Hunt will operate as a division of Consolidated.

Consolidated also plans construction of a $350,000 two-block terminal building in Portland.



**NEW BUILDING UNDERWAY** for Ledeen 30,000-sq. ft. headquarters in El Monte, Calif.

### Ledeen breaks ground for new California headquarters

Ledeen, Inc., manufacturer of pneumatic and hydraulic cylinder valves, actuators, pumps, and special equipment, has broken ground for its new headquarters in El Monte, Calif. The new plant will serve as headquarters for the Engineering Products Co., a Ledeen subsidiary which is a distributor firm handling mechanical power transmission and materials handling equipment lines.

The 30,000-sq. ft. building, which will house an office, machine shop, and warehouse, will have acoustical ceilings, fluorescent lighting, and modern color treatment. Shop facilities will have high intensity lighting and overhead crane installations for handling materials. The $200,000 project will also include indoor and outdoor facilities for dining and recreation.

## Stauffer plans fourth California acid plant

Stauffer Chemical Co. has announced plans to build its fourth California sulfuric acid plant at a cost of about $2,000,000. Construction will begin shortly, with full scale production scheduled for early 1957.

Stauffer now has sulfuric plants in Richmond, Vernon, and Dominquez, Calif. The new plant will be the second in Dominquez.

## Baker-Raulang appoints Mechanical Handling Co.

Baker-Raulang Co., Cleveland, Ohio, has appointed Mechanical Handling Co., Seattle, Wash., as a distributor. The firm will handle Baker's complete line of gas and electric fork lift trucks, crane trucks, ram, platform trucks, as well as the front-end loader and side-loading fork truck.

Mechanical Handling's territory will include Seattle and western Washington.

## Allis-Chalmers announces new distribution policy

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has announced a new distribution policy for the Buda Division's materials handling equipment.

Materials handling equipment dealers will now work through 12 factory branches and a Chicago district office. Branches will supervise sales and service and carry a stock of parts as well as new machines and accessories. The new arrangement should mean a closer contact for dealers and customers with the company.

Dealers will continue to stock machinery and parts for sales and service. Factory branches will have sales managers and service managers to work with the dealers.

## Rucker Co. distributes new lube equipment

Rucker Co., Oakland, Calif., has assumed exclusive distributorship of the Hannifin Crown line of filters, regulators, and lubricators. New on the industrial lubrication market, the line includes combination assemblies and such accessories as mounting brackets, regulators designed for panel mounting, remote control regulators, plastic control handles, T-mounted pressure gages, etc.

Regulators range from ¼ to 1½ in. in pipe size and the filters and lubricators are available in ¼- to 1-in. pipe sizes. Full stocks of the equipment are being maintained in the San Francisco Bay Area and Los Angeles offices of the Rucker Co.

## George Fry opens Los Angeles office

George Fry & Associates, Chicago-New York management consultants, has opened a Los Angeles office to serve West Coast industry and business. Resident manager for the new Fry office will be *Dr. Ward J. Jenssen*, a former partner in the Los Angeles management consulting firm of Jenssen, Beam & Martin.

Also named to Fry's Pacific Coast staff are senior consultants *Ralph L. Beam* and *John M. Martin*.

## Canfield to distribute for Penco, Sturdi-Bilt

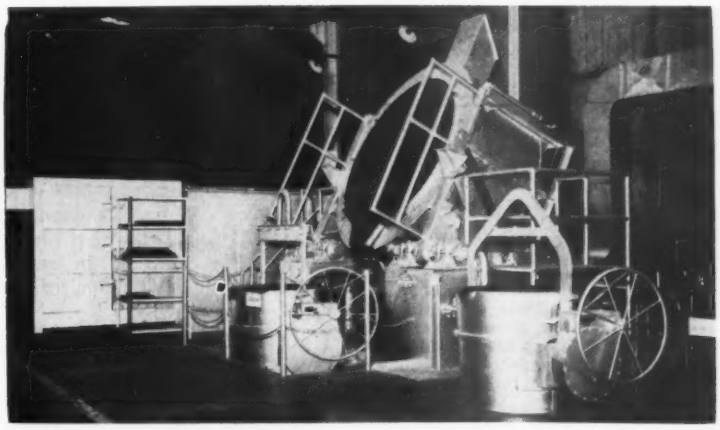
M. E. Canfield Co. has been appointed Southern California distributor for both the Penco Engineering Co., San Francisco, and Sturdi-Bilt Steel Products, Inc., Chicago.

Canfield will handle Penco's magnesium and steel bridge ramps in all of Southern California except the San Diego area.

For Sturdi-Bilt Canfield will distribute adjustable storage racks for pallets, skids, dies and bulk storage, and steel bulk bins.

## Sorensen & Co. opens West Coast office

Sorensen & Co.,. Inc., Stamford, Conn., manufacturer of power supplies and regulators for research and industrial applications, has opened a sales office to serve the West Coast area. Located in Hollywood, Calif., the office will provide more direct service and liaison for customers in that area, and will be of help to the firms technical representatives in the Western states.



**REPORTEDLY THE WORLD'S LARGEST,** this new furnace is saving 6.5c per lb. on the remelt of large obsolete dies at Douglas Aircraft.

## Advanced melting furnace saves money for Douglas

A SAVINGS of 6.5c per lb. is being obtained by Douglas Aircraft Co.'s Long Beach, Calif., plant through remelting large obsolete scrap dies in a new nose-tilting type Kirksite melting furnace. Multiplied by 200,000 lb., which was melted during a recent four-day period, this savings stacks up fast.

The new furnace also increases Douglas' pouring capacity with no increase in operating personnel. The 25,000-lb. capacity unit equipped with a nose-tilting mechanism does not require a pit. The ladel rests on the same floor level as the furnace. Sensitive control of the tilting speed by use of one lever handle control valve which actuates the oil-driven tilting mechanism provides safety as well as operating efficiency in filling molds.

This unit, according to Lyle N. H. Smith, Los Angeles representative for its manufacturer, Bellevue Industrial Furnace Co., is believed to be the largest of its type in the world.

Previous scrap value of the obsolete dies was 8.5c per lb. Now able to remelt the dies itself, Douglas realizes 15c per lb. from them.

# HOW TO PROTECT

**PIPE, PIPE JOINTS, TANKS AND COUPLINGS AGAINST**

# CORROSION

Apply
TAPECOAT®
*the Quality Coal Tar or Asphalt Coating in Handy Tape Form*

There's no need to gamble in fighting corrosion. Since 1941, TAPECOAT has proved its ability to give lasting protection on pipe, pipe joints, couplings, conduit, cable and insulated piping—above or below ground. Its resistance to moisture, acids, alkalis, electrolysis, salt water and other severe corrosive and abrasive conditions has established TAPECOAT as the time-tested quality protection to cut maintenance and replacement costs.

TAPECOAT is made as a coal tar or an asphalt coating in handy rolls of 2", 3", 4", 6", 18" and 24" widths. It is easy to apply, using a torch to soften or bleed the pitch, and then wrapped spirally around the vulnerable surface.

***For details on your specific needs, call our nearest distributor.***

**WEST COAST DISTRIBUTORS**

TAY HOLBROOK, Inc.
165 Eighth Street., San Francisco, Calif.
Phone: MArket 1-6800

PALMER SUPPLY COMPANY
222 Westlake Ave., North, Seattle, Wash.
Phone: Elliot 5141

R. K. BUTZ SALES
557 E. Walnut St., Pasadena 1, Calif.
Phone: SYcamore 5-4151

*The* TAPECOAT® *Company*

*Originators of Coal Tar and Asphalt Coatings in Tape Form*

1563 Lyons Street
Evanston, Illinois

*. . . for more details, circle No. 84*


## Edwards completes Seattle warehouse and office

**WIRE PRODUCTS** manufactured by E. H. Edwards Co. will be distributed in the Northwest from this new Seattle building.

E. H. Edwards Co., manufacturers of wire, wire rope, and other wire products, has completed its warehouse and office building in Seattle. The building, covering 13,300 sq. ft., doubles the firm's former office and storage space.

The structure includes special loading docks and ramps to accommodate truck and rail handling of the heavy reels of wire rope used by loggers and contractors in the Seattle region. Firm also serves Washington and parts of Idaho and Montana.

## Phillips Pacific picks up land option in Oregon

Phillips Pacific Chemical Co., a subsidiary of Phillips Petroleum Co., has picked up options on 200 acres of land in the Finley area east of Kennewick, Ore. The firm has plans for a $15,000,000 plant, the first phase of which will be completed in late 1956 to produce about 200 tons of anhydrous ammonia daily.

## Bliss Co. doubles West Coast facilities

E. W. Bliss Co. has doubled the facilities of its West Coast Division in Burbank, Calif. Expansion of manufacturing facilities will make possible the assembly of the firm's line of standard die sets in Burbank, where they were formerly shipped to Southern California from San Jose.

Coincident with the expansion, the firm has appointed *Randy Bailey* as assistant to the division manager, covering West Coast sales.

## Metal & Thermit buys Glenn power equipment

As another step in its expansion program, Metal & Thermit Corp. has acquired the Glenn Co., Oakland, Calif., manufacturers of constant voltage power sources, welding wire feeding devices, and other products. The business, which will be operated as a manufacturing subsidiary called M & T Welding Products Corp., will be moved to new quarters in Oakland.

Officers of the newly formed subsidiary include *H. E. Martin*, president; *G. G. Glenn*, *E. E. Anderson*, and *J. L. Oberg*, vice presidents; *J. F. Condon*, secretary, and *C. J. Beasley*, treasurer.

## Eitel to expand Salt Lake plants

Eitel-McCullough, Inc., plans to expand its Salt Lake City electronics plants in the next two years to employ 500 people. The firm has a current employment of 225 persons.

The expansion will also enable the firm to increase by 50% its production of power tubes and to establish a research center for micro-wave electronics devices. Production of a new klystron tube will also be added.

## Smith Chemical moves to Puente quarters

**INCREASED PRODUCTION** is provided to Smith Chemical with the acquisition of new and larger quarters in Puente, Calif.

E. W. Smith Chemical Co. has transferred its operations from Los Angeles to Puente, Calif., in an expansion move. The firm's new building and grounds provide greater facilities for increased production and a more complete research and testing laboratory.

Equipment and personnel have been added to provide a complete descaling service for boilers, tanks, cooling towers, and heat exchangers. Services are available throughout Southern California.

## Construction starts on U. S. Steel's third line

Construction work has started at United States Steel Corp.'s Pittsburg, Calif., plant for the installation of a third high-speed production line which will increase the firm's Western capacity for the production of electrolytic tin plate for the canning industry by almost 55%. Annual capacity of the product will be boosted from 285,000 tons to 440,000 tons when the line is completed late in 1957.

The project will also include installation of other production facilities and buildings, and the conversion of two hot dip tinning lines to reclassification equipment.

## American Brass mill to produce in 1956

American Brass Co. has predicted that its new $15,000,000 brass mill in Los Angeles will be producing copper and copper alloys during the last quarter of 1956. Construction of the new mill has proceeded on schedule and the plant should be at capacity operation by April 1957.

The 350,000-sq. ft. plant is located on a 45-acre plant site in Los Angeles' Paramount district. Supply and erection of steel is now in progress and the building should be enclosed by July 1. Manufacturing equipment will arrive in mid-summer.

## Chicago-Wilcox appoints California distributor

Chicago-Wilcox Manufacturing Co., Chicago, has appointed PenPower, Inc., to handle sales and service of its gaskets, shims, and washers in California. PenPower has offices in Los Angeles and San Francisco.

## Weirton Steel plans Western distribution

Weirton Steel Co., Weirton, W. Va., a division of National Steel Corp., has announced plans to set up a West Coast distribution facility in Oakland, Calif. A $600,000 warehouse, which has 120,000 sq. ft. of space, will be leased to Weirton by Bigge Drayage Co. for storage and distribution of steel products.

## Continental Oil plans refinery expansion

A $1,000,000 expansion is planned by Continental Oil Co., Spokane, Wash., for its Billings, Mont., refinery. The Billings refinery furnishes petroleum products for Spokane.

## Borden Cheese to finish Oakland plant expansion

An expansion which will nearly triple the size of the Oakland, Calif., cottage cheese plant of Borden Co.'s Pacific Cheese Division will be completed this month. The expansion will enable the plant to boost its production capacity to 50,000 lb. of cottage cheese daily.

The expansion includes a concrete building which will provide 25,000 sq. ft. of new space, increasing total plant space to 40,000 sq. ft. A research department and cheese packaging and slicing operations will be added. When completed the plant will employ 65 workers and will service northern and central California and Nevada.

## Lang to establish $50,000,000 industry park

Lang Development Co. of San Rafael, Calif., has announced plans to establish a $50,000,000 industrial park development in the Napa-Vallejo area. Some 125.7 acres of land will be rezoned for industrial use.

## Tapecoat appoints Holbrook, Palmer Supply distributors

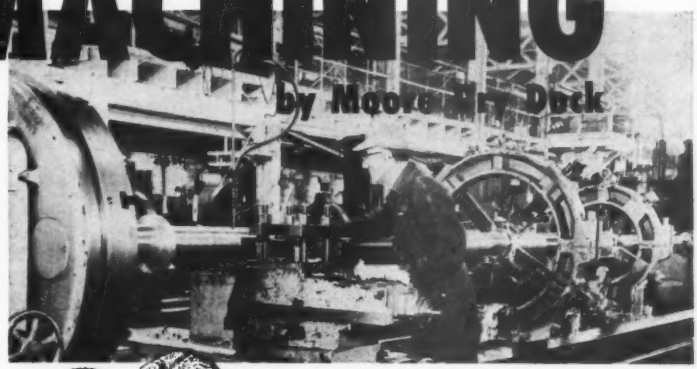
Tapecoat Co. of Evanston, Ill., has appointed Tay Holbrook, Inc., San Francisco, as its distributor for northern California, and the Palmer Supply Co. of Seattle to handle its sales in the Northwest. The addition of these two distributors gives Tapecoat complete coverage and warehousing facilities on the West Coast.

## Pope & Talbot plans wood products plant

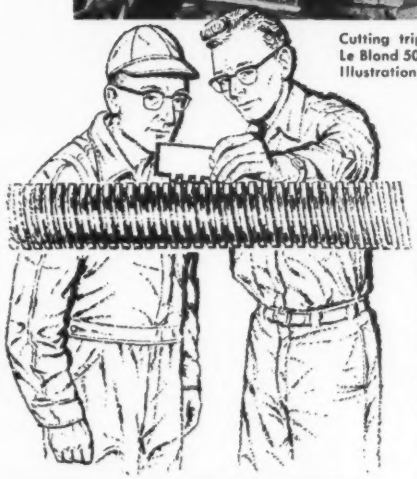
Pope & Talbot, Inc., has announced plans for the construction of a green veneer plant and a particle board plant in Oakridge, Ore. Work is scheduled to begin shortly on the structures, which are part of a $1,750,000 expansion program.


Serving the Leaders in Metalworking . . .

MACHINING by Moore Dry Dock



Cutting triple lead screw thread for steel mill shaft on Le Blond 50" swing x 39' between centers heavy duty lathe. Illustration: Checking Acme thread pitch with thread gauge



Shops in need of outside service on extraordinarily large machining work find Moore's massive, modern machine tools a welcome solution. Lathes to 100" swing, planers to 25' stroke, grinders to 24" swing, vertical mills to 18' swing, horizontal mills, keyseaters, slotters, radial drills, wheel press, and others—all with large work capacities—are available for precision machining to your tolerances. Join a long and distinguished list of regular Moore customers by letting us handle your next contract machining job.

Moore's "one shop" forging, heat treating, machining, and fabricating facilities offer cost-saving and convenience in the complete production of many metal products from raw stock to finished work.

MOORE DRY DOCK COMPANY

Foot of Adeline St., Oakland 23, California HIgate 4-3919

FORGING • HEAT TREATING • MACHINING • GRINDING • PLATE-SHEET-PIPE FABRICATION • STRUCTURAL STEEL FABRICATION AND ERECTION

*. . . for more details, circle No. 85 on Reader Service Postcard*

GEARS FOR INDUSTRY
THE *Lufkin* LINE
OIL FIELD PUMPING UNITS

**Turkish Bazaars Have Everything**

V. J. Fawcett

**A visit to Turkey is hardly complete without a visit to one of their bazaars. Surely, these native shopping centers must be the birthplace of our "supermarket." For centuries, the Turks have had supermarkets.**

Some of them are so large and so integrated that visitors and even natives have been know to get lost browsing in and out of their innumerable corridors lined with shopkeepers who merchandise everything from a Turkish Rug to a Pakistanian Piccolo!

**In Istanbul, not far from the Hilton, at the "KAPALI CARSI," it was fun to trade with the Turks. On this shopping expedition, among other things, purchased an Omega Wrist Watch, of which I am very proud. The gilt edge Certificate of Guarantee is written in French, Serial No. BK-12504 and is countersigned by President Adrien Rene, Omega Watch Company, Geneva, Switzerland.**

At this point, it may seem a little irrelevant to pull in Lufkin Pumping Units and Lufkin Precision Gears, both of which are in operation for Turkish Petroleum Corporation at Batman and Raman, Eastern Turkey. I can't read the French on my watch guarantee, but as everyone knows, the reliability of such a precision product by a firm know around the world goes unquestioned—even if written in Sanskrit.

**Buyers of Lufkin products likewise, do not necessarily have to be bi-lingual to recognize quality and craftsmanship. Like Omega, Lufkin products, too, are known around the world for dependability, durability, and designability.**

And as they say in Turkey, "SAGLAM."

*Lufkin* FOUNDRY
& MACHINE COMPANY
PACIFIC COAST DIVISION
5959 S. Alameda St., Los Angeles 1, Calif.
NORTHWEST SALES AND SERVICE
J. W. Minder Chain and Gear Co.
307 So. East Hawthorne Blvd.
Portland, Ore.
Dallas Lufkin, Texas New York

. . . *for more details, circle No. 86*

## Western Kraft to double paper mill capacity

Western Kraft Corp. has begun work to double the capacity of its kraft paper mill near Albany, Ore. The plant, with a capacity of 120 tons a day, began operations last September.

The $5,000,000 expansion will take place on the firm's 100-acre tract four miles north of Albany. Chip digester capacity will be increased and the paper dryer lengthened. Additional units should be completed in between 12 to 18 months.

## Western Paper buys South Salem site

Western Paper Converting Co. has purchased a 10-acre site in South Salem, where it plans to build a plant which will double its present capacity. Final construction plans will be made when the firm sells its present plant.

## Max Factor plans $1,000,000 expansion

Max Factor & Co., Hollywood, Calif., plans to spend $1,000,000 for expansion and modernization of its facilities in Hollywood and Toronto, Canada. The sum will finance a new 23,000-sq. ft. office and manufacturing plant in Toronto and the modernizing of the firm's five plants and warehouse in California.

The work, which is part of a $1,500,000 expansion program, is scheduled for late 1956 completion.

## Atomics International plans new reactor

Atomics International, a division of North American Aviation, Inc., plans to build a new type of experimental reactor for the AEC at the latter's reactor testing station in Idaho. Cost of the reactor, which will be completed late in 1956, will be $1,800,000.

The reactor will be used in AEC's search for more economical electric power from nuclear reactors, although no electricity will be produced from this reactor.

## Nielsen appoints new West Coast distributor

E. V. Nielsen, Inc., Stamford, Conn., has appointed Steel Processing & Distribution Co. as West Coast distributors for its line of Basco sheet steel separators. Steel Processing has offices in Los Angeles and Richmond, Calif.

**FAST PUMPING WITH VIKINGS in EITHER *DIRECTION***

Tri-Par Oil Company, Saukville, Wisconsin, makes good use of Viking Pump's reversible feature. The pumping system has a single suction line and a single discharge line which can be operated in either direction, eliminating the piping manifold. Speeded to deliver 325 G.P.M. the pumps can unload transports to storage and load delivery trucks from storage by merely reversing action.

Pumping units have lost no time from their operation, during the three years they have been in service, and have handled approximately 25,000,000 gallons of gasoline and fuel oil in that period.

Perhaps Viking Pumps can speed your operation and simplify your pumping. Types and sizes for most industrial pumping. For information, write for Bulletin 56Sa.

**VIKING PUMP COMPANY**
Cedar Falls, Iowa, U.S.A. In Canada, it's "*ROTO-KING*" pumps
See our catalog in Sweets
Pacific Coast Distributors: E. E. Burton, 4432 Long Beach Ave., Los Angeles 58, Calif., DeLaval Pacific Company, 201 E. Millbrae Ave., Millbrae, Calif.

. . . *for more details, circle No. 87 on Reader Service Postcard*

### Cold Metal appoints Dow sales representative

Cold Metal Products Co. of Los Angeles, Calif., has appointed William D. Dow of Dow Industrial Co., Seattle, Wash., as sales representative for the Cold Metal line in the Pacific Northwest. Dow has an extensive background in steel and related industries, including many years with Boeing Airplane in Seattle.

### S & W Electric appointed Feedrail representative

S & W Electric Co., Denver, Colo., has been appointed a representative for the Feedrail Corp., New York manufacturers of industrial trolley busway electrification systems. The firm will serve Montana, Idaho, Wyoming, Utah, Colorado, and New Mexico.

### Hughes Aircraft to build at Tucson missile plant

Hughes Aircraft Co., Culver City, Calif., has announced that it will construct at least one building at its Tucson, Ariz., guided missile production plant during 1958. When the plant is completed it will employ about 8,000 people to produce Falcon air-to-air guided missiles for the Air Force.

### Ziegler Steel opens San Fernando branch

Ziegler Steel Service Corp. has announced the opening of a San Fernando Valley branch in North Hollywood, Calif. This will make the second plant for Ziegler in the Los Angeles area. The firm also operates one plant in Oakland, Calif.

### Inland Empire plans pea processing plant

Inland Empire Pea Growers Assoc. has announced plans to build a $1,000,000 processing plant in Spokane, Wash., to replace its plant there which was destroyed by fire. The new facility will include a dry-pea splitting operation, feed mill, and seed plant.

### Clark Controller names Platt as distributor

Platt Electric Supply, Inc., Portland, Ore., has been appointed a distributor for Clark Controller Co., Cleveland, Ohio. Platt is a full-line supply company and will handle Clark's complete line of motor control equipment.

The firm's territory will include cities in Oregon, Washington, Idaho, Montana, Alaska, and Hawaii.


**Save up to $250.00 on your next in-plant delivery truck**

LOW, LOW INITIAL COST

MINIMUM MAINTENANCE COST

LOW OPERATING COST

—less than 10¢ per day

MODEL A
**TAYLORTRUCK**
3 or 4 WHEEL TYPES
*always silent, fast and fumeless.*

**FEATURES:** Hands-free operation with straddle-bar steering and simple treadle platform brake and throttle. Designed for narrow aisles. Only 30" wide, with turning radius of just 35". Four forward speeds up to 12 m.p.h. and reverse. Powerful, dust-sealed electric motor. Heavy-duty direct gear drive; no chains or belts.

MODEL B-5-72
**TAYLORTRUCK**
5-WHEEL TYPE
*for fast acceleration, dependable power and economy.*

**FEATURES:** This sturdy, highly maneuverable Taylortruck handles half-ton payloads. Quick acceleration with 5 forward speeds (up to 12 m.p.h.) and 5 reverse speeds. Offers 42" by 72" loading space; loading deck height 20". Dual rear-wheel drive; mechanically operated brakes are self-locking for parking. Timken bearings throughout on all models.

**TAYLORTRUCK**

Write today for information and literature.
TAYLOR MANUFACTURING CO
2114 W. Ball Road • Anaheim, Calif.

TEN STANDARD MODELS
*"Your in-plant task force"*

*... for more details, circle No. 88 on Reader Service Postcard*

The oldest and largest paint manufacturer in the West, W. P. Fuller & Co., needs no introduction to western business firms. They are well known for paints that last. They have been a familiar name on General Appraisal's client list for many years. Hundreds of leading firms like W. P. Fuller & Co., who are clients of General Appraisal Company are continuing proof that it will pay you to investigate the advantages of a General Appraisal.

GAC GENERAL APPRAISAL CO.

SEATTLE SEneca 6655 · PORTLAND ATlantic 1-0095
SAN FRANCISCO SUtter 1-2056 · LOS ANGELES TRinity 9631

*. . . for more details, circle No. 89*

Call Foster for all your Steel Pipe. You'll get fast dependable service from pipe specialists, with Shop Facilities for every type of Fabrication.

SEND FOR CATALOG WI-5

RAILS - TRACK EQUIPMENT - PIPE - PILING
L.B. FOSTER CO.
PITTSBURGH 30 • NEW YORK 7 • CHICAGO 4
ATLANTA 8 • HOUSTON 2 • LOS ANGELES 5

3460 Wilshire Blvd., Los Angeles 5

*. . . for more details, circle No. 90*

## General Controls increases San Francisco facilities

General Controls Co. has completed construction of a new building in San Francisco which increases its facilities there by 120%. The 4,400-sq. ft. structure will house offices, a showroom and warehouse, test facilities, and rooms for service schools and sales meetings.

## Alcon Products plant begins production

Alcon Products has begun production at its plant in the Schellville area of Sonoma Valley, Calif. The firm, which makes machinery, bomb, and tank parts, also has under construction a second building with 6,000 sq. ft. of floor space on the same site.

The firm, which employs under 25 people at present, expects to expand to 100 workers in the Schellville area.

## Construction starts on Thunderbird plant

Construction has started on the $11,000,000 fertilizer plant for Thunderbird Chemicals, Inc. Located south of Tempe, Ariz., the plant will be completed early in 1957. It is located on 80 acres of land.

## Paul-Munroe moves to new Bell headquarters

Paul-Munroe Co., Los Angeles representative for Rivett air and hydraulic valves and cylinders, has moved its headquarters to a 3,000-sq. ft. building in Bell, Calif. In conjunction with the move, the firm has added *R. A. Norberg* to its staff as sales engineer.

## Georgia Pacific to build kraft paper plant

Georgia Pacific has announced plans to build a kraft paper plant near Toledo. Ore., at the head of the Yaquina Bay near the firm's lumber mill and timber holdings on the coast. The $21,000,000 plant will have a capacity of 250 tons daily, or 90,000 tons annually.

## Crown Zellerbach plans furnace installation

Crown Zellerbach Corp. has announced plans for the installation of a $2,000,000 kraft recovery furnace at its Camas, Wash., mill. The furnace, designed to burn used cooking liquors from the kraft pulping process, will be in operation early in 1957.

The unit, the third at Camas, will have a daily capacity for handling the spent liquor from 350 tons of kraft pulp, doubling the mill's present recovery boiler facilities. The equipment will be custom built.

## MacDonald Co. to sell Cleaver-Brooks equipment

Cleaver-Brooks Co. of Milwaukee, Wis., has announced the appointment of R. F. MacDonald Co. of San Francisco as manufacturer's representative for the sale of Cleaver-Brooks boiler equipment. MacDonald will serve northern California and western Nevada.

## Oregon Metallurgical breaks ground at Albany

Oregon Metallurgical Corp. has broken ground on a 59-acre site a mile south of Albany for a titanium and zirconium forging and ingot casting plant. The newly formed corporation is headed by *Stephen M. Shelton*, general manager.

## Donnelly named Pritchard Washington representative

Frank K. Donnelly Co., Seattle, has been appointed Washington state sales representative for J. F. Pritchard & Co. of California, Kansas City, Mo. Donnelly will represent Pritchard's line of cooling towers and Hydryers, packaged dehydration units for air and other gases.

## Neely opens office in Las Cruces, N. Mex.

Neely Enterprises, electronic manufacturers' representative, has opened its seventh office. The new center, locatd in Las Cruces to serve the southern part of New Mexico, will be managed by *Earl C. Davis*.

Neely's main office is located in North Hollywood, Calif., and other branches are in California, Arizona, and New Mexico. The new office will serve the White Sands Proving Ground, Holloman Air Force Base, and other electronics industries in the area.

## Gladding, McBean plant nears completion

Gladding, McBean & Co.'s Renton, Wash., plant facilities are nearing completion with the addition of a $150,000 main factory building. The building replaces a four-story structure in use by the ceramic products firm for over 50 yr.

Some 15,000 sq. ft. of floor space will be gained in the steel frame building and will aid the company in its production of fire clay refractories, high temperature mortar and cement, facing brick, and clay products.

# WESTERNERS AT WORK . . .

## Yale & Towne Co. names Vining regional manager

Yale & Towne Manufacturing Co. has named *Garnett A. Vining* Western regional sales manager of its Materials Handling Division. The naming of a direct representative in the West falls under Yale's current program to give more comprehensive coverage to materials handling equipment markets.

Vining, formerly manager of Yale gas powered industrial truck sales, will have supervisory control of activities in the 11 Western states and northwestern Canada. He will headquarter in San Francisco.

## Earl Hudson to manage Rockwell's California plant

*Earl Hudson,* assistant general manager of Rockwell Manufacturing Co.'s gas meter plant in DuBois, Pa., has been appointed general manager of the firm's new meter and valve plant in Porterville, Calif. Hudson joined Rockwell in 1937, and has had experience in production, personnel, purchasing, and other administrative positions.

## U. S. Motors appoints Schultz Western manager

R. L. Schultz

United States Motors Corp., Oskosh, Wis., has appointed *Robert L. Schultz* Western regional manager in charge of the firm's operations in the Western states, Honolulu, and Alaska. His duties will include establishing and training distributors and dealers, supervising government and utility contracts, and performing technical liaison work with architects and engineers. He will headquarter in San Francisco.

## W. P. Downey to head Hyster Truck Division

Hyster Co. has promoted *William P. Downey* to the position of supervising engineer of its straddle truck division in Portland, Ore., replacing *H. Noel Dimick* who recently retired. Downey has been with Hyster for 14 years.

## Jackson, Wehrli appointed Robertshaw general managers

Robertshaw-Fulton Controls Co. has announced two West Coast executive appointments. *Wilbur Jackson,* a vice president of the firm, has been named general manager of the Grayson Controls Division, Long Beach, Calif. Formerly works manager of the division, he has been with the firm since 1928.


**Essential tool of the aircraft industry**

In modern day aircraft construction, the pneumatic drill has become an essential tool of the industry—simplifying the hand-riveting of countless parts within confined areas.

**ESSENTIAL TOOL OF ALL INDUSTRY**

**...modern banking services**

Such are the facilities of California Bank, the industrial, business-minded bank serving the Industrial Center of the West.

California Bank

Los Angeles

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

*. . . for more details, circle No. 91 on Reader Service Postcard*

# how to sell the West's manufacturing industries

THE KEY to successful selling in the West is good sales representation backed with effective, penetrating advertising support. Western salesmen **need extra** help because of added selling problems. Vast distances between major population centers and sources of distribution require more time, travel, expense, and effort for Western salesmen. Minimizing these problems requires special effort—in a special advertising medium.

That means going West with your advertising, going West with your sales story in the magazine read by more of the West's industrial buyers than any other—WESTERN INDUSTRY, the key to successful selling in the West!

FACTORIES in the West are young, buying habits are being formed. Get your story across when it counts most—now, and in the competitive years ahead!

***Selling the West is an 11-state job***

**Western Industry**

***Covers it all!***


*Robert L. Wehrli* has been appointed general manager of the Aeronautical Division, Anaheim, Calif. He was formerly Aeronautical's director of research and development; prior to that he served as head of research and chief physicist at Reaction Motors, Inc.

## Jensen to head C & D engineering, marketing

H. E. Jensen

*Henry E. Jensen*, vice president in charge of engineering at C & D Batteries, Inc., Conshohocken, Pa., will head both engineering and marketing. Stepping into the newly created joint post he succeeds *Samuel W. Gibb*, vice president in charge of sales in the marketing end. Gibb has taken an indefinite leave of absence.

Associated with C & D since 1947, Jensen formerly served as engineering consultant, development engineer, chief engineer, and was appointed to vice president of engineering in 1953.

## Goodrich names Harper Los Angeles plant manager

*Frank E. Harper* has been named plant manager in charge of manufacturing at the Los Angeles plant of B. F. Goodrich Co.'s Tire and Equipment Division. He succeeds *James F. Sweatt*, who has retired.

*J. A. Sharkey* succeeds Harper as production superintendent at the plant.

## Associated Spring Corp.

. . . has promoted *Howard W. Unkrey* to plant superintendent at its Seaboard Coil Spring Division in Gardena, Calif. The firm also named *Randall K. Otten* as purchasing agent and *William H. Schuck* as consultant product engineer in the sales estimating department.

## Hall-Scott Motors Co.

. . . has announced that *Albert N. Ballard* has joined the firm as factory manager of the electronics division in Burbank, Calif. Ballard has had industrial management experience at Convair Corp. and White Motor Co.

## Duraloy Co.

. . . has appointed *George H. Thurston*, Orinda, Calif., to represent the firm in sales and service for that part of California north of Los Angeles. He is a former consulting metallurgist and manufacturers' representative.

Duraloy, whose home offices are in Scottdale, Pa., produces alloy static, centrifugal, and shell-molded castings.

## Soule Steel Co.

. . . has appointed *Boris Smirnoff* as engineering and manufacturing consultant at its home office and plant in San Francisco. *Peter Molinari* has succeeded Smirnoff as plant superintendent in San Francisco, while *Alvin Schurner* has been promoted to assistant plant superintendent. *Guy Haskins* succeeds Molinari as production engineering supervisor.

## R. H. Braun Co.

. . . has announced the appointment of two new sales engineers, *Bob Enright* and *Ed Linnemeyer*.

Enright first joined Braun in the service department, eventually becoming supervisor of the firm's fleet of service trucks. Linnemeyer has had 20 years of experience in the sales field, handling automotive parts in California, Washington, and Oregon.

## Colorado Fuel & Iron Corp.

. . . has promoted *C. Clay Crawford* to superintendent of the Pueblo plant's seamless tube mill. *William M. Watt* has been named assistant superintendent of the tube mill's finishing mill, while *Leo C. Hilt* will take over as assistant superintendent in the hot mill.

Crawford, formed assistant superintendent of the tube mill, succeeds *E. A. Gilmore*, who has resigned.

## Electric Steel Foundry Co.

. . . has announced the transfer of *Frank C. Cook* from the Eugene, Ore., sales district to Salt Lake City, where he will act as district representative for the San Francisco sales area. He has replaced *Garland Allen*, who has returned to the Portland sales district after three years in the intermountain territory.

*Patrick Feyerisen* has replaced Cook in the Eugene sales office, while *Lewis McMurran* has been added to the Seattle sales district.

## North American Aviation, Inc.

. . . has appointed *Stanley D. Zemansky* as assistant to the general manager of the Autonetics Division, Los Angeles. Since 1953 he has been serving as general supervisor of operations for the Electro-Mechanical Products Operations.

### Cooling Tower Institute

. . . has elected as its new president *James P. Wiseman*, president of Fluor Products Co. of Whittier, Calif. He has succeeded *Neal B. LauBach* of Hudson Engineering Corp., Houston, Texas.

Other officers elected for 1956 terms with the association, which is composed of manufacturers of industrial water cooling towers, include vice president *Forrest B. Reed* of Marley Co., Kansas City, Mo.; secretary *Karl E. Johnson* of J. F. Pritchard & Co. of California, Kansas City; and treasurer *Denis E. O'Neil* of Foster Wheeler Corp.'s cooling tower department, San Mateo, Calif.

### American Potash & Chemical Corp.

. . . has appointed *Henry S. Curtis* as plant manager of its Henderson, Nev., subsidiary, American Potash & Chemical Corp. (Nev.). Curtis was formerly employed at Monsanto Chemical Co. as administrative assistant to the head of the engineering department. As plant manager he will be senior operating executive responsible to the firm's vice president of manufacturing, *Parker S. Dunn*.

### Beckman Instruments, Inc.

. . . has named *Thomas Scatchard* plant manager for its Berkeley division, which produces electronic counting instruments, analog computers, nuclear instruments, and electronic systems. Scatchard leaves his former position as plant manager of assembly for Merchant Calculators, Inc., to join the Berkeley group.

### Joseph T. Ryerson & Son, Inc.

. . . has made *Howard A. Stai* manager of tubular steel products and cold finished steel bar sales at the Seattle steel service plant, succeeding *Loren B. Clay*, who has transferred to the firm's Los Angeles plant in a similar capacity. Stai joined Ryerson in 1949 and served most recently as a sales representative.

### St. Paul & Tacoma Lumber Co.

. . . West Coast forest products manufacturer, has appointed *Corydon Wagner, Jr.*, as assistant manager of the firm's plywood division in Olympia, Wash., and made *Fred Peterson* the plywood plant superintendent. Wagner has been with the company's timber and raw materials division for the past year, while Peterson has served eight years as supervisor of the St. Paul plywood specialities department.

# CLASSIFIED SECTION

**Space is sold as advertisers' inches. All advertisements in this section are ⅛ inch short of contracted space to allow for borders and composition. Rates are $9.00 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.**

### Marchant Calculators, Inc.

. . . has announced several executive and supervisory personnel advancements in its manufacturing division.

*John E. Wilson* has been promoted to superintendent of Plant 1 in Oakland, Calif., advancing from superintendent of the tool division. He will direct all the company's processing operations from raw stock to finished parts.

*Rollo Lawrenz*, formerly superintendent of Plant 1, has been appointed superintendent of Plant 2, Marchant's assembly plant, while *G. A. Rodrigues* has been named general foreman of Plant 1, heading the supervisory personnel.

### Gen-A-Matic Corp.

. . . has named *Frank Sauve* production manager at its Van Nuys, Calif., plant. He will supervise production of the firm's line of generators, pumps, flasher lights, and earth boring machines.

### National Supply Co.

. . . has promoted *Glenn C. Merkley*, who has been with the firm for 33 years, to plant manager of the Torrance, Calif., plant. He will be in charge of the steel, fabricating, and plant staff departments. Merkley's past experience with the firm has been in the fields of engineering and sales.

### Food Machinery & Chemical Corp.

. . . has announced that *Harry A. Oldenkamp* has joined the firm as manager of central engineering. For the past eight years he has been associated with American Machine & Foundry Co. He will headquarter at the company's offices in San Jose, Calif.

*Robert R. Ball* has been named sales representative in the Santa Clara Valley and San Francisco Bay area for the Canning Machinery Division. He succeeds *Hubert H. Wagner* in the Santa Clara territory; Wagner has been transferred to the sales staff of the Export Division as supervisor of canning machinery sales.

*Jack W. Stahl* succeeds Ball as agency and supply supervisor of the division's Western sales department.


LET PHOTOS *Sell* YOUR PRODUCT

GENUINE 8 x 10 PHOTOS as low as 7c each

WHY PAY MORE?

24 HOUR SERVICE

You Can't Buy A Better Photo At Any Price

8x10 Glossies { 1000—7c ea., 500—8c ea. 100—10c ea., 50—13c ea.

Postcards { 5000—$21 per M. 2½c ea. in 1000 lots

FREE DELIVERY ANYWHERE

*Made from your negative or photo*

WRITE FOR COMPLETE PRICE LIST

Q HOllywood 7-6179 UANTITY PHOTOS, Inc.

5509 SUNSET BLVD., HOLLYWOOD 28, CALIF.

LARGEST PHOTO REPRODUCTION PLANT IN WEST


### Calera Mining Co.

. . . has named *J. Stanley Mitchell* plant superintendent of its cobalt refinery at Garfield, Wash. A mining and metallurgical engineer, Mitchell has been with Calera since 1947.

### Standard Oil Co. of California

. . . has named *J. T. Higgins* to succeed *Francis H. Smith* as general manager of operations in the manufacturing department. Smith has retired after 43 years of service with the firm. Higgins has been serving as president of Standard's subsidiaries in Salt Lake City.

### Gardner-Denver Co.

. . . has appointed *Les Kennedy* as sales engineer in its Seattle branch to handle industrial products including Keller Tool Division equipment. He was formerly a tooling engineer for Lockheed Aircraft in Georgia.

### Edson Dronberger

. . . West Coast district sales manager for Armco Steel Corp., Los Angeles, died recently at the age of 50. For the past three years he was in the Los Angeles offices of Armco. Prior to that he served eight years as Berkeley, Calif., district manager. He was with the firm for 29 years.

# ADVERTISERS in the May 1956 WESTERN INDUSTRY


A

Air Reduction Pacific Company . . . . . 27
Alan Wood Steel Company . . . . . 50
Allis-Chalmers Mfg. Co.
Buda Division . . . . . 24
American Blower Corporation
Subsidiary of American Radiator & Standard Sanitary Corporation . . . . . 48
American Brake Shoe Company
AmForge Division . . . . . 5
Anaconda Wire & Cable Company
Subsidiary of Anaconda Copper Mining Company . . . . . 86

B

Blackmer Pump Company . . . . . 88
Brown, David (Canada), Limited
U.S.A. Pacific Branch . . . . . 98
Buffalo Forge Company . . . . . 58
Byers, A. M., Company . . . . . 29

C

C & D Batteries, Inc. . . . . 80
Caine Steel Company of California . . . . . 60
California Bank, Los Angeles . . . . . 105
Calstrip Steel Corporation . . . . . 65
Clark Equipment Company . . . . . 9
Cleveland Vibrator Company . . . . . 81
Cold Metal Products of California Cover 4
Coldwell, Banker & Company . . . . . 96
Columbia-Geneva Steel Division
United States Steel Corporation . . . 19 & 75
Consolidated Freightways, Inc. . . . . 61
Copperweld Steel Company
Ohio Seamless Tube Division . . . . . 15

D

Dayton Foundry . . . . . 92
Dempster Brothers, Inc. . . . . 30 & 31
Denison Engineering Company, The . . . . . 23
Detrex Corporation . . . . . 77
Dick, R. & J., Company, Inc. . . . . 79
Dodge Manufacturing Corporation . . . . . 20

E

Electrolift, Inc. . . . . 72
Eutectic Welding Alloys Corp. . . . . 69
Evans Rule Co. . . . . 85

F

Foster, L. B., Co. . . . . 104

G

Garfield Chemical & Manufacturing Corp. . 90
Garrett Supply Co.
Division of Garrett Corp. . . . . 51
General Appraisal Co. . . . . 104
General Petroleum Corporation . . . . . 33
Globe Hoist Company . . . . . 83
Goodall Rubber Company . . . . . 56
Great Lakes Carbon Corporation
Dicalite Division . . . . . 91

H

Hassall, John, Inc. . . . . 88

I

Industrial Wire Products Corporation . . . . 78

J

Johnson Gear & Mfg. Co. . . . . 90
Johnston, A. P., Co. Inc. . . . . 108
Jorgensen, Earle M., Steel Company . . . . 25
Joy Manufacturing Company . . . . . 91

K

Kaiser Steel Corporation . . . . . 97
Kingwell Brothers . . . . . 76

L

Linde Air Products Co.
Union Carbide & Carbon Co. . . . . 12
Link-Belt Company . . . . . 7
Lufkin Foundry & Machine Co. . . . . 102

M

Mass, A. R., Chemical Co. . . . . 63
Martin, Glenn L., Company . . . . . 8
Metal & Thermit Corporation . . . . . 62
Micro Switch
A Division of Minneapolis-Honeywell Regulator Company . . . . . 16
Milford Rivet & Machine Co. . . . . 80
Miller-Robinson Co. . . . . 78
Milwaukee Electric Tool Corp. . . . . 32
Monarch Rubber Company, The . . . . . 3
Moore Dry Dock Co. . . . . 101

N

National Carloading Corporation . . . . . 95
National Supply Company, The
Industrial Products Division . . . . Cover 2
New London Engineering Company . . . . . 70
Norton Company, The . . . . . 59

O

Oakite Products, Inc. . . . . 89
Ohio Seamless Tube Division
Cooperweld Steel Company . . . . . 15

P

Pacific Scientific Company . . . . . 87
Pacific Telephone &
Telegraph Company, The . . . . . 73
Perin, Ira G., Co. . . . . 74
Petley, Inc. . . . . 92

R

Rapids-Standard Co., Inc. . . . . 72
Reeves Pulley Division
Reliance Electric & Engineering Co. 10 & 11
Revere Copper & Brass Incorporated . . 46 & 47
Richfield Oil Corporation . . . . . 57
Ridge Tool Company, The . . . . . 28
Rust-Oleum Corporation . . . . . 17
Ryerson, Joseph T., & Son, Inc. . . . . 34

S

Savolt Corporation . . . . . Cover 3
Shell Oil Company . . . . . 55
Sierra Drawn Steel Corporation . . . . . 80
Skil Corporation, The . . . . . 21
Slick Airways, Inc. . . . . 22
Standard Conveyor Co. . . . . 76
Standard Horse Nail Corporation . . . . . 92
Standard Oil Company of California . . . . 13
Sturdi-Bilt Steel Products . . . . . 90
Surety Rubber Company . . . . . 89

T

Tapecoat Company, The . . . . . 100
Taylor Manufacturing Co. . . . . 103
Tools-Equipment Corporation . . . . . 86
Trent Inc. . . . . 70
Tuthill Pump Company . . . . . 78

U

United States Steel Corporation
Columbia-Geneva Steel Division . . 19 & 75

V

Victor Equipment Co. . . . . 71
Viking Pump Company . . . . . 102

W

Western Industry . . . . . 106
Westinghouse Electric Corporation
Sturtevant Division . . . . . 6
Wisconsin Motor Corporation . . . . . 79

Y

Yuba Manufacturing Co. . . . . 81



Johnston Stainless Welding Rods

Practical, Down-to-Earth Welding Rods
Alloys as they are supposed to be

Corrosion Resistant—
Clean metal

Strong—
Low in cracking

A. P. JOHNSTON CO., INC.
1845 E. 57th St., Los Angeles 58

# *Industrial Executives*

## CURTAIL RISING COSTS!

**SAVOLT ENGINEERING ANALYSIS**
**REDUCES UTILITY COSTS...savings up to 20%**
**NO SAVINGS SHOWN...NO COST TO YOU!**

Each year American Industry spends millions of dollars needlessly through improper use of utilities. Working in the interest of both user and utility, Savolt engineering specialists increase efficiency of utilization and determine the most economical rate structure. Keep pace with automation and increased labor costs, write or phone for full details on the Savolt Plan today!

★ **Engineering of new facilities**
★ **Engineering Analysis**
★ **Rate Analysis**
★ **Coordination of Utilities**

**HARBOR 5217**

UTILITY COST CONTROL THROUGH ENGINEERING

THE **savolt** CORPORATION

**California Registered Engineering Specialists**
**503 32nd Street, Newport Beach, California**

*... for more details, circle No. 93 on Reader Service Postcard*

CHECK

THE ADVANTAGES

YOU ENJOY

WHEN

YOU

ORDER FROM

CMP OF CALIFORNIA

☐ ONE SOURCE FOR ALL YOUR NEEDS

CMP Low Carbon Strip Steel, CMP Annealed Spring Steel, CMP Tempered Spring Steel, CMP Shim Steel, CMP Feeler Gauge Stock, CMP Cement Finishing Trowel Stock, CMP Electro Zinc Coated Stock, Paintloc, Tin Coated Steel in Coils, Armco Zinc-grip Paintgrip, CMP High Tensile Stainless Steel, Armco Stainless Steel Strip, Sheets, Plates and Bars, 4130 Aircraft Quality in Coils, Sheets or Plates, Flat Wire.

☐ LARGE STOCKS FOR DEPENDABLE SERVICE

Largest stocks west of the Rockies in most lines

☐ HIGHEST QUALITY MATERIALS

CMP Cold Rolled Strip Steel, Armco Stainless Steel Sheets and Plates

☐ THE EXACT SIZE YOU NEED

Complete facilities for slitting, shearing and cutting to length

☐ TIME AND MONEY SAVING SERVICE

Every facility to insure fast, on-time deliveries

☐ HELPFUL TECHNICAL ASSISTANCE

CMP technicians often can help in selecting the material to do the best job most economically and in developing most efficient fabricating processes.

It will pay you to check your needs with CMP. Phone RAymond 3-4581 in Los Angeles; DOuglas 2-1794 in San Francisco; CYpress 5-2161 in San Diego; ELiot 6370 in Seattle or AMhurst 5-5490 in Phoenix.

CMP of California

THE COLD METAL PRODUCTS COMPANY OF CALIFORNIA

2131 SOUTH GARFIELD AVENUE, LOS ANGELES 22, CALIFORNIA

Telephone: Los Angeles — RAymond 3-4581; San Francisco — DOuglas 2-1794; San Diego — CYpress 5-2161; Seattle — ELiot 6370; Phoenix — AMhurst 5-5490

*. . . for more details, circle No. 94 on Reader Service Postcard*